22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

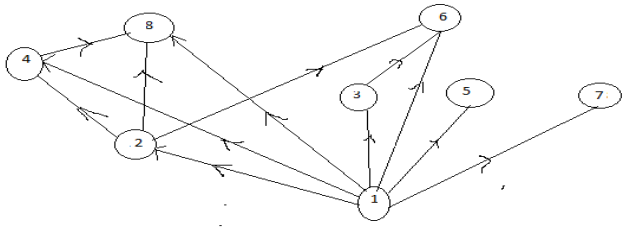
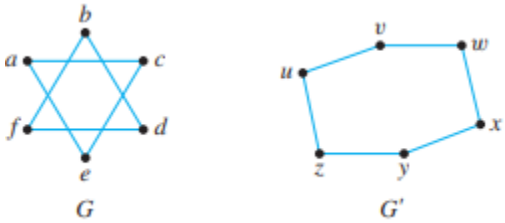
Course Objectives:

1	To study the concepts needed to test the logic of a program.
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :1

CO1	Construct the truth value for each proposition i)p NAND q ii) p NOR q	[AP]
CO2	Negate each quantified proposition. (1) Every computer is a 16-bit machine. (2) Some girls are blondes.	[AP]
CO3	If a set A has n elements then how many elements are there in the power set?	[AP]
CO4	Draw the digraphs representing the partial ordering {(a,b) /a divides b} on the set {1,2,3,4,5,6,7,8}. Reduce it to the hasse diagram representing the given partial ordering. 	[AP]
CO5	Find the quotient q and the remainder r when -23 is divided by 5.	[AP]
CO6	 Check whether they are isomorphic if not Show that the pairs of graphs are not isomorphic by finding an isomorphic invariant that they do not share	[AP]

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Course Outcomes:
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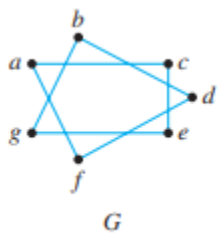
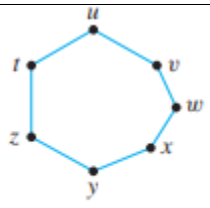
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :2

CO1	Prove the implication $p \to q \Rightarrow p \to (p \wedge q)$	[AP]
CO2	Negate each proposition, where the UD = set of integers. (1) $(\forall x)(x^2 = x)$ (2) $(\exists x)(\lvert x\rvert = x)$	[AP]
CO3	If A has m elements and B has n elements then how many elements are there in A×B?	[AP]
CO4	Prove, by mathematical induction $1.2.3 + 2.3.4 + 3.4.5 + \ldots\ldots + n(n+1)(n+2) = \frac{1}{4}n(n+1)(n+2)(n+3)$	[AP]
CO5	find the quotient and the remainder when the first integer is divided by the second. -43, 16	[AP]
CO6	 G  G' Check whether they are isomorphic if not Show that the pairs of graphs are not isomorphic by finding an isomorphic invariant that they do not share	[AP]

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Course Outcomes:
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CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
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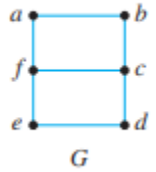
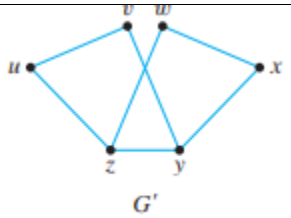
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :3

CO1	Using truth table verify that the proposition $(p \wedge q) \wedge \neg(p \vee q)$ is a contradiction	[AP]
CO2	**Determine the truth value of each proposition, where the UD consists of the numbers ± 1, ± 2, and 0.** **1.** $(\forall x)(x^2 = 4)$ **2.** $(\exists x)(x^3 + 2x^2 = x + 2)$ **3.** $(\forall x)(x^5 + 4x = 5x^3)$ **4.** $(\forall y)(y^4 + 3y^2 = 2)$ **5.** $\sim(\forall x)(x^3 = x)$ **6.** $(\forall x)[\sim(x^5 = 4x)]$	[AP]
CO3	Check whether the function $f(x) = 5x^2 + 7$ is injective.	[AP]
CO4	Prove, by mathematical induction $1^2 + 3^2 + 5^2 + \ldots\ldots\ldots\ldots\ldots\ldots (2n-1)^2 = \frac{1}{3}n(2n-1)(2n+1)$	[AP]
CO5	If $2^n - 1$ is a prime number, show that n is prime.	[AP]
CO6	 G  G' Check whether they are isomorphic if not Show that the pairs of graphs are not isomorphic by finding an isomorphic invariant that they do not share.	[AP]

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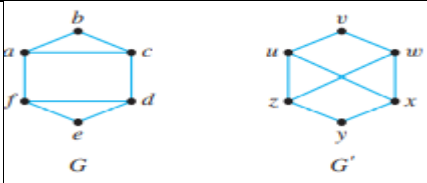
Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :4

CO1	State the truth value of “If tigers have wings then the earth travels round the sun”	[AP]
CO2	Rewrite the sentence Some chalkboards are black, symbolically.	[AP]
CO3	If f:Z→N is defined by $f(x)=\begin{cases}2x-1, & if \quad x>0\\ -2x, & if \quad x\le 0\end{cases}$ (a)Prove that f is one-to-one and onto.(b) Determine f^{-1}.	[AP]
CO4	Prove, by mathematical induction $n!\ge 2^{n-1}$, $for \quad n=1,2.3.....$	[AP]
CO5	Find the quotient and the remainder when the first integer is divided by the second. -37, 73	[AP]
CO6	 Check whether they are isomorphic if not Show that the pairs of graphs are not isomorphic by finding an isomorphic invariant that they do not share	[AP]

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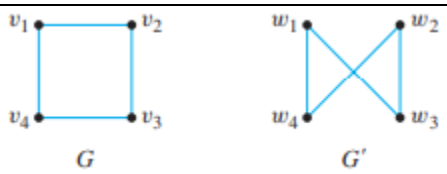
Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :5

CO1	Write the following statements in symbolic form “If either Pavithra takes calculus or Sharmila takes sociology then Malathy takes English”	[AP]
CO2	Rewrite each proposition symbolically, where UD = set of real numbers. (1) For each integer x, there exists an integer y such that $x + y = 0$. (2) There exists an integer x such that $x + y = y$ for every integer y. (3) For all integers x and y, $x \cdot y = y \cdot x$. (4) There are integers x and y such that $x + y = 5$.	[AP]
CO3	If $f, g, h : R \to R$ are defined by $f(x) = x^2 - 4x$, $g(x) = \frac{1}{x^2+1}$ and $h(x) = x^4$. Find $((f \bullet g) \bullet h)(x) = (f \bullet (g \bullet h))(x)$ and check if they are equal	[AP]
CO4	Use mathematical induction to show that $1 + 2 + 2^2 + \ldots\ldots\ldots\ldots + 2^n = 2^{n+1} - 1$	[AP]
CO5	Determine if 1601 is a prime number.	[AP]
CO6	 Check whether they are isomorphic if not Show that the pairs of graphs are not isomorphic by finding an isomorphic invariant that they do not share	[AP]

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Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
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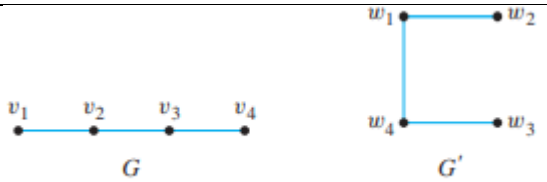
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :6

CO1	Find the contrapositive of inverse of $p \rightarrow q$	[AP]
CO2	Negate proposition, where x is an arbitrary integer. $(\forall x)(x^2 > 0)$	[AP]
CO3	Determine whether each of the following functions is an injection and /or a surjection. $f : R \rightarrow R$, defined by $f(x) = 3x^3 + x$.	[AP]
CO4	Use mathematical induction to prove that $n < 2^n$,for all positive integers .	[AP]
CO5	Find gcd{ 1976, 1776}.	[AP]
CO6	 Check whether they are isomorphic if not Show that the pairs of graphs are not isomorphic by finding an isomorphic invariant that they do not share	[AP]

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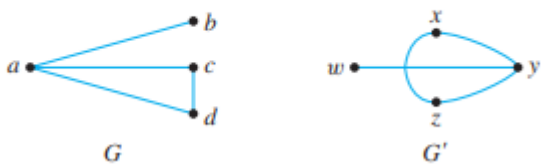
Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :7

CO1	What is the duality law of logical expression? Give the dual of $(p \vee F) \wedge (q \wedge T)$	[AP]
CO2	$(\exists x)(x^2 \neq 5x - 6)$ Negate the proposition where x is an arbitrary integer	[AP]
CO3	Determine whether each of the following functions is an injection and /or a surjection. $f : Z^+ \to Z^+$, defined by $f(x) = x^2 + 2$.	[AP]
CO4	Prove by mathematical induction $1+3+5+.....+(2n-1) = n^2$	[AP]
CO5	Apply the Euclidean algorithm to find gcd { 2076, 1024}.	[AP]
CO6	Are the two graphs shown below isomorphic? If so, define an isomorphism.  	[AP]

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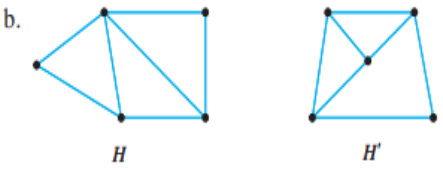
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :8

CO1	Obtain CNF of $p \wedge (p \rightarrow q)$	[AP]
CO2	Every supercomputer is manufactured in Japan.-Negate	[AP]
CO3	Determine whether each of the following functions is an injection and /or a surjection. $f : R \rightarrow R$, defined by $f(x) = -4x^2 + 12x - 9$.	[AP]
CO4	Prove by mathematical induction $1.2 + 2.3 + 3.4 + \ldots\ldots\ldots\ldots + n(n+1) = \frac{n(n+1)(n+2)}{3}$	[AP]
CO5	Express the gcd in terms of 2076 and 1024.	[AP]
CO6	Show that the following pairs of graphs are not isomorphic by finding an isomorphic invariant that they do not share b.  H H'	[AP]

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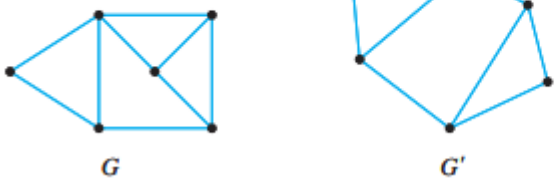
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :9

CO1	Write the contrapositive, the converse and the inverse of the conditional statement " If you work hard then you will be rewarded"	[AP]
CO2	There are no white elephants.-Negate	[AP]
CO3	Determine whether each of the following functions is an injection and /or a surjection. $f : R \to R$, defined by $f(x) = -4x^2 + 12x - 9$.	[AP]
CO4	Solve the recurrence relations: $a_{n+1} - 2a_n 5; n \geq 0; a_0 = 1$	[AP]
CO5	Determine if the positive integer is a prime. 1681	[AP]
CO6	Show that the following pairs of graphs are not isomorphic by finding an isomorphic invariant that they do not share. a.  G G′	[AP]

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CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
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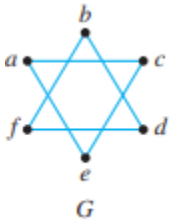
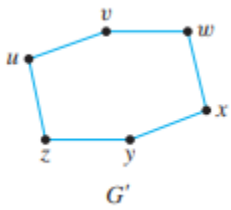
Roll Number :10

CO1	Construct the truth value for each proposition i)p NAND q ii) p NOR q	[AP]
CO2	Negate each quantified proposition. (1) Every computer is a 16-bit machine. (2) Some girls are blondes. (3) All chalkboards are black. (4) No person has green eyes.	[AP]
CO3	Determine whether each of the following functions is an injection and /or a surjection. $f : Z \to Z$ defined by $f(x) = x^2 + 14x - 51$.	[AP]
CO4	Prove by mathematical induction the results $n^3 - n$ is divisible by 6	[AP]
CO5	Determine if the positive integer is a prime. 1723	[AP]
CO6	 G  G' Check whether they are isomorphic if not Show that the pairs of graphs are not isomorphic by finding an isomorphic invariant that they do not share	[AP]

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CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
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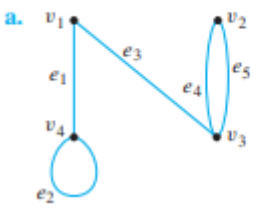
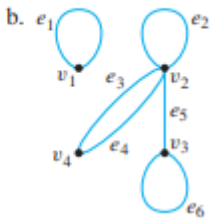
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :11

CO1	Simplify the Boolean expression $p \wedge (p \wedge q)$	[AP]
CO2	Rewrite the sentence symbolically, where the UD consists of real numbers.- The product of any two real numbers x and y is positive.	[AP]
CO3	$f : Z \to Z$ defined by $f(x) = 2x$ Determine whether each of the following functions is an injection and /or a surjection.	[AP]
CO4	Prove by mathematical induction the results $n^5 - n$ is divisible by 5	[AP]
CO5	Add the binary integers 10110_{two} and 1011_{two}.	[AP]
CO6	Find adjacency matrices for the following (undirected) graphs. a.  b. 	[AP]

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Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :12

CO1	Simplify the Boolean expression $(p \wedge \neg q) \vee (p \wedge q) \vee r$	[AP]
CO2	There are real numbers x and y such that x = 2y-. Rewrite the sentence symbolically, where the UD consists of real numbers	[AP]
CO3	Show that $f : R \to R$ defined by $f(x) = 2x - 3$ is a bijection and find its inverse. Compute $f^{-1} \bullet f$ and $f \bullet f^{-1}$.	[AP]
CO4	Prove by mathematical induction $n^2 < 2^n$, *for* $n > 4$	[AP]
CO5	Multiply 1011_{two} and 101_{two}.	[AP]
CO6	Find directed graphs that have the following adjacency matrices: a. $\begin{bmatrix} 1 & 0 & 1 & 2 \\ 0 & 0 & 1 & 0 \\ 0 & 2 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}$ b. $\begin{bmatrix} 0 & 1 & 0 & 0 \\ 2 & 0 & 1 & 0 \\ 1 & 2 & 1 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

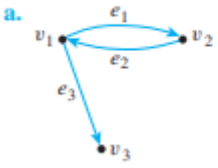
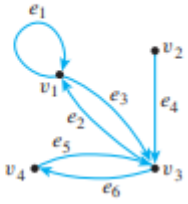
Course Objectives:

1	To study the concepts needed to test the logic of a program.
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :13

CO1	Simplify the Boolean expression $p \vee (p \vee q)$	[AP]
CO2	Check the validity of the following argument. If the computer was down Saturday afternoon, then Mary went to a matinee. Either Mary went to a matinee or took a nap Saturday afternoon. Mary did not take a nap that afternoon. $\therefore$ The computer was down Saturday afternoon.	[AP]
CO3	Show that the function $f(x, y) = x^y$ is a primitive recursive function.	[AP]
CO4	Prove by mathematical induction the results $n^3 - n$ is divisible by 6	[AP]
CO5	Evaluate $1011_{two} \times 101_{two}$.	[AP]
CO6	Find the adjacency matrices for the following directed graphs. a.  b. 	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

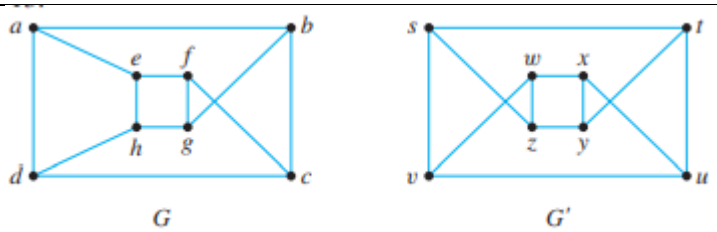
Course Objectives:

1	To study the concepts needed to test the logic of a program.
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :14

CO1	Construct the truth table for $(p \to q) \to (q \to p)$	[AP]
CO2	Verify inference is a tautology $p \to (p \vee q)$	[AP]
CO3	Show that $f(x, y) = x + y$ is a primitive recursive function.	[AP]
CO4	Solve the recurrence relations $a_n = 2a_{n-1} + 3.2^n; n \geq 1; a_0 = 5$	[AP]
CO5	Subtract 1011_{two} from 100001_{two}.	[AP]
CO6	 Check whether they are isomorphic if not Show that the pairs of graphs are not isomorphic by finding an isomorphic invariant that they do not share	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

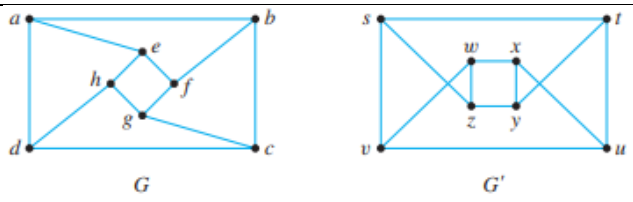
Course Objectives:

1	To study the concepts needed to test the logic of a program.
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :15

CO1	Find the PCNF & PDNF of $(q \vee (p \wedge r)) \wedge \neg((p \vee r) \wedge q)$	[AP]
CO2	Test the validity of the argument $p \leftrightarrow q$ $\sim p \vee r$ $\sim r$ ——— $\therefore \sim q$	[AP]
CO3	If $A = \{1,2,3,4,5\}, B = \{1,2,3,8,9\}$ and the functions $f: A \to B$ and $g: A \to A$ are defined by $f: \{(1,(8)),(3,9),(4,3),(2,1),(5,2)\}$ and $g = \{(1,2),(3,1),(2,2),(4,3),(5,2)\}$, find $f \bullet g$, $g \bullet f$, $f \bullet f$, and $g \bullet g$, if they exists.	[AP]
CO4	Solve the recurrence relations: $a_{n+1} - 2a_n 5; n \geq 0; a_0 = 1$	[AP]
CO5	Express the number in base 10.- **1.** 1101_{two} **2.** 11011_{two}	[AP]
CO6	 G G' Check whether they are isomorphic if not Show that the pairs of graphs are not isomorphic by finding an isomorphic invariant that they do not share.	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

Course Objectives:

1	To study the concepts needed to test the logic of a program.
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :16

CO1	Write the dual of the statement $\neg(p \vee q) \vee [(\neg p) \wedge q] \vee p$	[AP]
CO2	Test the validity of the arguments If Bill likes cats, he dislikes dogs. Bill likes dogs. _____ $\therefore$ Bill dislikes cats.	[AP]
CO3	Determine whether the following function is an injection and /or a surjection: $f : R \to R defined \quad by \quad f(x) = 3x^3 + x$	[AP]
CO4	Consider the tree with root v_0 shown below. a. What is the level of v_5? b. What is the level of v_0? c. What is the height of this rooted tree? d. What are the children of v_3? e. What is the parent of v_2? f. What are the siblings of v_8? g. What are the descendants of v_3? 	[AP]
CO5	Express each decimal number as required $1076 = (\quad)_{two}$ $1776 = (\quad)_{eight}$	[AP]
CO6	Find the number of ways a committee of three students and five professors can be formed from a group of seven students and 11 professors.	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :17

CO1	Prove that the premises $a \rightarrow (b \rightarrow c), d \rightarrow (b \wedge \neg c) \,\&\, (a \wedge d)$ are inconsistent.	[AP]
CO2	Give the conclusion $p \leftrightarrow q$ $\sim p \vee r$ $\sim r$	[AP]
CO3	Determine whether the following function is an injection and /or a surjection: $f : R \rightarrow R$ *defined by* $f(x) = -4x^2 + 12x - 9$	[AP]
CO4	Use mathematical induction to prove that $n^3 + 2n$ is divisible by 3,for $n \geq 1$	[AP]
CO5	Express each binary number in base 16.- 110111_{two} 11101_{two}	[AP]
CO6	Find the number of ways a committee of three students and five professors can be formed from a group of seven students and 11 professors.	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :18

CO1	Give a direct proof for the implication $p \to (q \to s), (\neg r \vee p), q \Rightarrow (r \to s)$	[AP]
CO2	Give the conclusion $\begin{array}{l} p \to q \\ p \vee \sim r \\ r \end{array}$	[AP]
CO3	If A={1,2,3},B={w,x,y,z} and $f : A \to B$ how many functions $g : B \to A$ are onto?	[AP]
CO4	Use mathematical induction to show that $1+2+3+.....+n=\frac{1}{2}n(n+1)$	[AP]
CO5	Rewrite each number in base two. $3AD_{sixteen}$ $237_{sixteen}$	[AP]
CO6	Find the number of ways a committee of four students, four professors, and three administrators can be formed from a group of six students, eight professors, and five administrators.	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :19

CO1	Prove the implication $p \to q \Rightarrow p \to (p \wedge q)$	[AP]
CO2	Give the conclusion $p \to q$ $\sim r \to \sim q$ $\sim r$	[AP]
CO3	Determine whether the following function is one-to-one and /or onto $f : R \to R$ given by $f(x) = 2x - 3$f	[AP]
CO4	For all integers $n \geq 3, 2n + 1 < 2^n$. -Prove	[AP]
CO5	1111_{two} $+ 1011_{\text{two}}$	[AP]
CO6	Find the number of lines that can be drawn using 10 distinct points, no three being collinear.	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :20

CO1	Prove directly that the product of any two odd integers is an odd integer.	[AP]
CO2	Show that the conclusion $\forall x(P(x) \rightarrow \neg Q(x))$ follows from the premises $\exists x(P(x) \wedge Q(x)) \rightarrow \forall y(R(y) \rightarrow S(y))$ *and* $\exists y(R(y) \wedge \neg S(y))$	[AP]
CO3	If R is the relation on the set of integers such that $(a,b) \in R$, iff $3a + 4b = 7n$ for some integer n, prove that R is an equivalence relation.	[AP]
CO4	Use mathematical induction to prove that for all integers $n \geq 3$, $2n + 1 < 2^n$.	[AP]
CO5	3076_{sixteen} $+ 5776_{\text{sixteen}}$	[AP]
CO6	Find the number of triangles that can be drawn using 10 points, no three being collinear.	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

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4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :21

CO1	. Find the truth tables for. (a) $p \vee \neg q$; (b) $\neg p \wedge \neg q$. Verify that the proposition $(p \wedge q) \wedge \neg(p \vee q)$ is a contradiction.	[AP]
CO2	Using indirect method prove that $\forall x(P(x) \vee Q(x)) \Rightarrow (\forall x P(x)) \vee (\exists x Q(x))$	[AP]
CO3	Let $X = \{1,2,3,4,\ldots,7\}$ and $R = \{(x, y)/x - y \text{ is divisible by } 3\}$. Show that R is an equivalence relation	[AP]
CO4	For all integers $n \geq 1$, $1 + 6 + 11 + 16 + \cdots + (5n - 4) = \frac{n(5n-3)}{2}$. -Prove	[AP]
CO5	. 101101_{two} – 10011_{two}	[AP]
CO6	Find the number of different arrangements of the letters of the word REFERENCE.	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
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4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :22

CO1	Prove directly-The sum of any two even integers is even.	[AP]
CO2	Prove the implication $\forall x(P(x) \to Q(x)), \forall x(R(x) \to \neg Q(x)) \Rightarrow \forall x(R(x) \to \neg P(x))$	[AP]
CO3	If R is the relation on the set of integers such that $(a, b) \in R$, iff $3a + 4b = 7n$ for some integer n, prove that R is an equivalence relation.	[AP]
CO4	$1^2 + 2^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$, for all integers $n \geq 1$.	[AP]
CO5	3076_{sixteen} $+ 5776_{\text{sixteen}}$	[AP]
CO6	Find the number of bytes containing exactly three 0's.	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
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3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :23

CO1	If the square of an integer is even, then the integer is even.-Prove by using law of contrapositive	[AP]
CO2	Use the indirect method to prove that the conclusion $\exists z\, Q(z)$ follows from the $\forall x\,(P(x) \rightarrow Q(x))$ *and* $\exists y\, P(y)$	[AP]
CO3	Prove that the relation set inclusion $\subseteq$ is a partial ordering on any collection of sets.	[AP]
CO4	For all integers $n \geq 1$, $1 + 6 + 11 + 16 + \cdots + (5n - 4) = \frac{n(5n-3)}{2}$.	[AP]
CO5	Arrange the binary numbers 1011, 110, 11011, 10110, and 101010 in order of increasing magnitude.	[AP]
CO6	Is a graph with four vertices a, b, c, and d with deg (a)= 4, deg (b)= 5= deg (d), and deg (c)= 2 possible?	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

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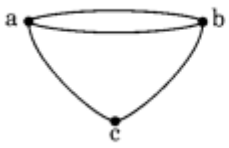
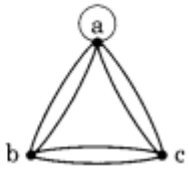
Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :24

CO1	Prove by contradiction, where p is a prime $\sqrt{2}$ is an irrational number. number.-	[AP]
CO2	Show that $\exists x(P(x) \wedge Q(x)) \Rightarrow (\exists x P(x)) \wedge (\exists x Q(x))$	[AP]
CO3	Prove that analytically $(A-C) \cap (C-B) = \phi$,Where A,B and C are sets. Verify graphically	[AP]
CO4	Prove For all integers $n \geq 1$, $2+4+6+\cdots+2n = n^2+n$.	[AP]
CO5	Draw the Hasse diagram for the partial ordering $\{(A, B)/A \subseteq B\}$ on the power set P(S) where $S = \{a, b, c\}$. Find the maximal ,minimal, greatest and least elements of the poset.	[AP]
CO6	**1.**  **2.**  Find the number of vertices and edges of the graphs	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

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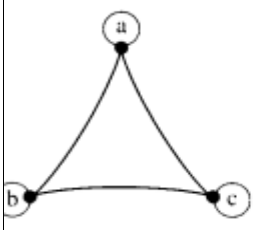
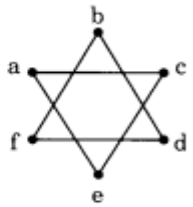
Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :25

CO1	Let p be "It is cold" and let q be "It is raining". Give a simple verbal sentence which describes each of the following statements: $(a)\ \neg p$; $(b)\ p \wedge q$; $(c)\ p \vee q$; $(d)\ q \vee \neg p$.	[AP]
CO2	Show that the conclusion $\forall x(P(x) \rightarrow \neg Q(x))$ follows from the premises $\exists x(P(x) \wedge Q(x)) \rightarrow \forall y(R(y) \rightarrow S(y))$ *and* $\exists y(R(y) \wedge \neg S(y))$	[AP]
CO3	If $A_1 = \{1,2\}, A_2 = \{2,3\}, A_3 = \{1,2,3,6\}$ then find $A_1 \cup A_2 \cup A_3$ and $A_1 \cap A_2 \cap A_3$	[AP]
CO4	Use mathematical induction to prove that $1 + 2 + \cdots + n = \frac{n(n+1)}{2}$ for all integers $n \geq 1$.	[AP]
CO5	Find the value of the base b $-54_b=64$	[AP]
CO6	 4.  Find the degrees of the vertices of the graphs i	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :26

CO1	Show that $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ are logically equivalent	[AP]
CO2	Show that $\forall x(P(x) \rightarrow (Q(y) \wedge R(x))), \exists x P(x) \Rightarrow Q(y) \wedge \exists x(P(x) \wedge R(x))$	[AP]
CO3	Let X= {1,2,3,4} and R = {(x,y) / x > y}. Draw the graph of R and also give its matrix.	[AP]
CO4	prove that, for every positive integer n, $1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}$	[AP]
CO5	Find the value of the base b -1001_b=9	[AP]
CO6	Determine if it is a tree 	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

Course Objectives:

1	To study the concepts needed to test the logic of a program.
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :27

CO1	Obtain DNF and CNF for $(p \rightarrow (q \wedge r)) \wedge (\neg p \rightarrow (\neg q \wedge \neg r))$	[AP]
CO2	If $P(x) : x = x^2$ be the statement. If the universe of discourse is the set of integers, what are the truth values of (a) $P(-1)$ (b) $(\forall x)\ P(x)$	[AP]
CO3	Let $X = \{1,2,3,4,\ldots,7\}$ and $R = \{(x, y)/x - y \text{ is divisible by } 3\}$. Show that R is an equivalence relation	[AP]
CO4	prove that, for every positive integer n, $$1 + 2 + 3 + \cdots + n = \frac{n(n+1)}{2}$$	[AP]
CO5	Find the value of base b 144_b=49	[AP]
CO6	Determine if it is a tree 	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

Course Objectives:

1	To study the concepts needed to test the logic of a program.
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :28

CO1	Prove that $((p \vee q) \wedge \neg(\neg p \wedge (\neg q \vee \neg r)))$ is a tautology	[AP]
CO2	What is the negation of the statement $(\forall x)(x^2 > x)$ *and* $(\exists x)(x^2 = 2)$?	[AP]
CO3	R and S are “Congruent modulo 3” , “Congruent modulo 4” relations respectively on the set of integers. That is $R = \{(a,b) / a \equiv b(\text{mod } 3)\}$ and $S = \{(a,b) / a \equiv b(\text{mod } 4)\}$.Find (i)R $\cup$ S (ii)R - S	[AP]
CO4	Prove that $2n^3 + 3n^2 + n$ is divisible by 6 for every integer $n \geq 1$.	[AP]
CO5	Find the prime factorization of the following 10!	[AP]
CO6	Compute the height of each tree.- A full balanced binary tree with 10 leaves.	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :29

CO1	Using indirect method of proof derive $p \to \neg s$ from the premises $p \to (q \vee r), q \to \neg p$, $s \to \neg r, p$	[AP]
CO2	Consider the argument: Premise: If you bought pen, then you went to the shop Premise: You bought pen Conclusion: You went to the shop Symbolize the above argument	[AP]
CO3	R and S are “Congruent modulo 3” , “Congruent modulo 4” relations respectively on the set of integers. That is $R = \{(a,b) / a \equiv b(\text{mod } 3)\}$ and $S = \{(a,b) / a \equiv b(\text{mod } 4)\}$.Find (i)$R \cap S$ (ii)$S - R$	[AP]
CO4	What are the number of arrangements of all the six letters in the word PEPPER?	[AP]
CO5	Let $f(n) = 50n^3 - 6n + 23$. Show that $f(n) = O(n^3)$.	[AP]
CO6	Rewrite the infix expression in prefix form. $a + b * c/(d - e) \uparrow f$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :30

CO1	Show that b can be derived from the premises $a \to b, c \to b, d \to (a \vee c), d$ by indirect method	[AP]
CO2	Examine the truth value of the quantification $\exists x P(x)$ where P(x) is the statement "x>10“ and universe of discourse is the set of real numbers	[AP]
CO3	When is a function said to be injective, surjective and bijective?	[AP]
CO4	How many distinct four-digit integers can one make from the digits 1,3,3,7,7 and 8?	[AP]
CO5	Show that $n! = O(n^n)$ and $\lg n! = O(n \lg n)$.	[AP]
CO6	Rewrite the infix expression in prefix form $a \uparrow (b \uparrow c) + d/e - f$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

Course Objectives:

1	To study the concepts needed to test the logic of a program.
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :31

CO1	Prove that $a \rightarrow \neg d$ is a conclusion from the premises $a \rightarrow b \vee c$, $b \rightarrow \neg a$, $d \rightarrow \neg c$ by using conditional proof	[AP]
CO2	Consider the following statements of which the first three are premises and the fourth is valid conclusion.“All humming birds are richly colored.”“No large birds live on honey.”“Humming birds are small.”Assuming that the universe of discourse is the set of all birds express the statements in the argument using quantifiers.	[AP]
CO3	Find 25(mod7) and -35(mod11)	[AP]
CO4	In how many ways can the symbols a,b,c,d,e,e,e,e,e be arranged so that no e is adjacent to another e?	[AP]
CO5	Let $f(n) = 6n^2 + 5n + 7 \lg n!$. Estimate the growth of $f(n)$.	[AP]
CO6	Rewrite the infix expression in prefix form $(a + b * c)/(d - e/f) \uparrow g$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :32

CO1	Using the CP – Rule derive $p \to (q \to s)$ from the premises $p \to (q \to r)$ and $q \to (r \to s)$	[AP]
CO2	Write the scope ,bound and free variables of the statement $\exists t[Q(s,t)]$	[AP]
CO3	If $R_1 = \{(0,0),(1,1),(2,2),(3,3)\}$ is defined as a relation on the {0,1,2,3} Find if it is equivalence relation?	[AP]
CO4	Show that $7x^2$ is $O(x^2)$	[AP]
CO5	Let $f(n) = (3n^2 + 4n - 5) \lg n$. Estimate the growth of $f(n)$.	[AP]
CO6	Rewrite the infix expression in prefix $a - (b * c + d)/e * f - g \uparrow h$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :33

CO1	Show that the following set of premises is inconsistent : If Rama gets his degree, he will go for a job. If he goes for a job, he will get married soon. If he goes for higher study,he will not get married . Rama gets his degree and goes for higher study.	[AP]
CO2	If $P(x)$ denotes the statement "$x \leq 4$",what are the truth values of i) $P(0)$ ii) $P(4)$	[AP]
CO3	Draw the Hasse diagram for the poset $\{2,4,5,10,12,20,25 / \text{divides}\}$. Which are maximal and minimal elements of the poset?	[AP]
CO4	Write the dual of each of the following statements in lattice: i) $(a \wedge b) \vee c = (b \vee c) \wedge (c \wedge a)$ ii) $(a \wedge b) \vee a = a \wedge (b \vee c)$	[AP]
CO5	Using the big-oh notation, estimate the growth of the function. $f(n) = 2n + 3$	[AP]
CO6	Translate the infix into post fix $a - (b * c + d)/e * f - g \uparrow h$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
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3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :34

CO1	Show that $r \rightarrow s$ can be derived from the premises $p \rightarrow (q \rightarrow s), \neg r \vee p$ *and* q	[AP]
CO2	Translate the statement into English ,where $C(x)$ is "x is a comedian"and $F(x)$ is "x is funny" and the universe of discourse consists of all people $\exists x(C(x) \rightarrow F(x))$	[AP]
CO3	If $R_1 = \{(0,0),(1,1),(2,2),(3,3)\}$ is defined as a relation on the {0,1,2,3} Find if it is equivalence relation?	[AP]
CO4	How many different outcomes are possible when 5 dice are rolled?	[AP]
CO5	Using the big-oh notation, estimate the growth of the function. $f(n) = 2n^3 - 3n^2 + 4n$	[AP]
CO6	Translate the infix into postfix expression $(a + b * c)/(d - e/f) \uparrow g$	[AP]

2MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :35

CO1	Show that $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ are logically equivalent	[AP]
CO2	Rewrite to logical expressions using predicates, quantifiers and logical connectives "Everyone is your friend and is perfect"	[AP]
CO3	Compute $A \cup B, A \cap B, A - B$ and $A \oplus B$. if $A = B = \{a, b, c\}$.	[AP]
CO4	State the isotonic property of a lattice.	[AP]
CO5	Using the big-oh notation, estimate the growth of the function $f(n) = 3 + \lg n$	[AP]
CO6	Translate the infix into postfix expression $a \uparrow (b \uparrow c) + d/e - f$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

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Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :36

CO1	Prove that $(p \to q) \wedge (q \to r) \Rightarrow (p \to r)$	[AP]
CO2	Express the negations of the proposition using quantifiers and in English “There is a student in this class who has never seen a computer”	[AP]
CO3	The relation R on the set A ={1,2,3,4,5} is defined by the rule (a,b)∈R, if 3 divides a-b. (i)List the elements of R and R^{-1} (ii)Find the domain and range of R (iii)Find the domain and range of R^{-1}. (iv)List the elements of the complement of R.	[AP]
CO4	Prove by mathematical induction that $n! \geq 2^{n-1}, n = 1,2,3.....$	[AP]
CO5	Use the Euclidean algorithm to find that the greatest common divisor of 330 and 156 is 6. Use the results of those calculations to express gcd(330, 156) as a linear combination of 330 and 156	[AP]
CO6	Rewrite the prefix into infix $+ * \uparrow abc * de$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

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Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :37

CO1	Write the following statements in symbolic form “If either Pavithra takes calculus or Sharmila takes sociology then Malathy takes English”	[AP]
CO2	What rule of inference is used “Jerry is a Mathematics major and a computerscience major. Therefore, Jerry is a Mathematics major”.	[AP]
CO3	Let f be a function from to defined by f(a)=4, f(b)=2,f(c)=1 and f(d)=3.Is f a bijection?	[AP]
CO4	Prove by mathematical induction $1.2.3 + 2.3.4 + 3.4.5 + \ldots\ldots\ldots + n(n+1)(n+2) = \left(\frac{1}{4}\right)n(n+1)(n+2)(n+3)$	[AP]
CO5	Show that 660 and 43 are relatively prime, and find a linear combination of 660 and 43 that equals 1	[AP]
CO6	Rewrite the prefix into infix $+a \uparrow /b - cde$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT	2/1/2/4
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Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :38

CO1	Find the contrapositive of inverse of $p \rightarrow q$	[AP]
CO2	What is a predicate give an example.	[AP]
CO3	Let f be the function from {a,b,c} to {1,2,3} such that f(a)=2,f(b) =3 and f(c)=1.Is f invertible and if it is ,what is its inverse?	[AP]
CO4	Graph the Hasse diagram for the “less than or equal to “ relation {0,2,5,10,11,15}	[AP]
CO5	Show that 660 and 43 are relatively prime, and find a linear combination of 660 and 43 that equals 1	[AP]
CO6	Rewrite the prefix into infix $- \uparrow + a * bcd * ef$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
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Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :39

CO1	When is a proposition said to be a contradiction. Give an example.	[AP]
CO2	Symbolize the following statements: (a) Some people who trust others are rewarded. (b) If anyone is good then John is good	[AP]
CO3	Let f be the function from the set of integers to the set of integers such that f(x)=x+1.Is f is invertible and if it is, what is its inverse?	[AP]
CO4	Using regular notation of $C(n,r)$, find $C(n,n)$	[AP]
CO5	Suppose $a = bq + r$ where a,b,q and r are integers. Then prove that gcd (a,b)=gcd (b,r) .Also find the GCD of 414 an 662 using the Euclidean Algorithm.	[AP]
CO6	Rewrite the prefix into infix $**-a+bcd\uparrow e-fg$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :40

CO1	What are the contrapositive and the converse of the conditional statement “The home team wins whenever it is raining”.	[AP]
CO2	Write the negation of the statement $(\exists x)(\forall y)P(x,y)$	[AP]
CO3	Suppose that A={1,2,3} and B={1,2}.Let R be the relation from A to B containing (a,b) if $a \in A, b \in B, a > b$ .What is the matrix representing R?	[AP]
CO4	When x is real number, show that $\lfloor x \rfloor + \left\lfloor x + \frac{1}{2} \right\rfloor = \lfloor 2x \rfloor$	[AP]
CO5	Using prime factorization, find the gcd and lcm of (231,1575)	[AP]
CO6	Rewrite the postfix to infix $ab - cd - /ef \uparrow *$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
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3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :41

CO1	Prove that $(p \to q) \wedge (q \to r) \to (p \to r)$ is a tautology.	[AP]
CO2	What is the negation of the statement $(\forall x)(x^2 > x)$ *and* $(\exists x)(x^2 = 2)$?	[AP]
CO3	Prove that (A-C) ∩(C-B) =Φ analytically, where A,B ,C are sets. Verify graphically.	[AP]
CO4	If $\{L, \leq\}$ is a lattice ,then for any $a, b, c \in L$, then prove that $a \wedge (b \vee c) \geq (a \wedge b) \vee (a \wedge c)$	[AP]
CO5	Use Euclidean Algorithm to find gcd(1819,3587)	[AP]
CO6	Rewrite the postfix to infix $ab - cd - /ef \uparrow *$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :42

CO1	Construct the truth table of the compound proposition $(p \vee \neg q) \rightarrow (p \wedge q)$	[AP]
CO2	Define free and bound variables	[AP]
CO3	Let R be the relation on the set of integers such that aRb if and only if a-b is an integer. Show that R is an equivalence relation.	[AP]
CO4	Prove by mathematical induction, that $\frac{1}{1.2}+\frac{1}{2.3}+\frac{1}{3.4}+.....+\frac{1}{n(n+1)}=\frac{n}{n+1}$	[AP]
CO5	Suppose $a=bq+r$ where a, b, q and r are integers. Then prove that gcd (a,b)=gcd (b,r) .Also find the GCD of 414 an 662 using the Euclidean Algorithm.	[AP]
CO6	Rewrite the postfix to infix $ab-cd-/e\uparrow$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :43

CO1	Let p,q and r be the propositions p: Grizzly bears have been seen in the area. q: Hiking is safe on the trail. r: Berries are ripe along the trail.Write these Propositions using p,q and r and logical connectives i)Berries are ripe along the trail, but grizzly bears have not been seen in the area. ii)Grizzly bears have not been seen in the area and hiking on the trail is safe, but berries are ripe along the trail.	[AP]
CO2	If $P(x): x = x^2$ be the statement. If the universe of discourse is the set of integers, what are the truth values of (a) $P(-1)$ (b) $(\forall x)\ P(x)$	[AP]
CO3	If R={(1,2),(2,4),(3,3)} and S={(1,3),(2,4),(4,2)}, find (i)R∪S (ii)R∩S (iii)R-S (iv)S-R(v)R⊕S. Also verify that dom(R∪S) =dom(R)∪dom(S) and range (R∩S)⊆ range(R)∩range(S)	[AP]
CO4	Draw the Hasse diagram of all lattices with 5 elements	[AP]
CO5	State the fundamental theorem of arithmetic	[AP]
CO6	Rewrite the postfix to infix $abc + d * /e * f -$	[AP]

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3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :44

CO1	Find the PCNF and PDNF of $(q \vee (p \wedge r)) \wedge \neg((p \vee r) \wedge q)$	[AP]
CO2	Define Universal Generalisation	[AP]
CO3	Show that the relation $R = \{(x, y)/x, y \in Z, x - y \text{ is divisible by } 3\}$ is an equivalence relation.	[AP]
CO4	Draw the Hasse diagram of S, where S be the relation divides on B= {2,3,4,6,12,36,48}.	[AP]
CO5	State and prove the Fermat's little theorem. Hence show that the integer 561 is a composite number.	[AP]
CO6	Rewrite the postfix to infix $ab - cd - /e \uparrow$	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
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3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :45

CO1	Write the contrapositive, the converse and the inverse of the conditional statement " If you work hard then you will be rewarded"	[AP]
CO2	Define Existential Specification	[AP]
CO3	Draw the Hasse diagram for the partial ordering $\{(A, B)/A \subseteq B\}$ on the power set P(S) where $S = \{a, b, c\}$. Find the maximal ,minimal, greatest and least elements of the poset.	[AP]
CO4	If $\{L, \leq\}$ is a lattice ,then for any $a, b, c \in L$, then prove that $a \vee (b \wedge c) \leq (a \vee b) \wedge (a \vee c)$	[AP]
CO5	State and fundamental theorem of arithmetic	[AP]
CO6	Rewrite the postfix to infix $ab/cd/efg - + * +$	[AP]

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Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :46

CO1	Give a direct proof for the implication $p \to (q \to s), (\neg r \vee p), q \Rightarrow (r \to s)$	[AP]
CO2	Write the scope and free variables of the statement $(\forall\ x)\ [P(x,y)]$	[AP]
CO3	If $R = \{(1,2),(2,4),(3,3)\}$ & $S = \{(1,3),(2,4),(4,2)\}$, Find (a)$R \bigcup S(b)R - S$ (c)$R \oplus S$.Also verify th at $dom(R \cup S) = domR \cup domS$ and range $(R \cap S) \subseteq$ range $(R) \cap$ range (S).	[AP]
CO4	Graph the Hasse diagram for the "divisibility relation on "{2,4,5,10,12,20,25} starting from digraph.	[AP]
CO5	Write the dual of each of the following statements in lattice: i) $(a \wedge b) \vee c = (b \vee c) \wedge (c \wedge a)$ ii) $(a \wedge b) \vee a = a \wedge (b \vee c)$	[AP]
CO6	Write an algorithm to traverse a binary tree in: Preorder.	[AP]

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Nature of Course : Theory with Practical

Course Objectives:

1	To study the concepts needed to test the logic of a program.
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Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :47

CO1	Construct an argument to show that the following premises imply the conclusion “it rained”. “If it does not rain if there is no traffic dislocation, then the sports day will be held and the cultural program will go on’’, “If the sports day is held the trophy will be awarded ‘’ and ‘’the trophy was not awarded’’	[AP]
CO2	If L(x,y) symbolises the statement “x likes y” where the universe of discourse for both x and y consists of all people in the world. Translate the following English sentences into logical expressions: (i)Everybody likes z (ii)Everybody likes somebody	[AP]
CO3	Verify the Associative and Distributive law of algebra of sets by using Venn diagram	[AP]
CO4	How many permutations of the letters A B C D E F G contain (a) the string BCD, (b) the string CFGA, (c) the strings BA and GF, (d)the strings ABC and DE?	[AP]
CO5	If n is a composite integer, then n has a prime divisor less than or equal to $\sqrt{n}$.	[AP]
CO6	Write an algorithm to traverse a binary tree in: Post order.	[AP]

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3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :48

CO1	Prove that the premises $a \rightarrow (b \rightarrow c), d \rightarrow (b \wedge \neg c) \,\&\, (a \wedge d)$ are inconsistent.	[AP]
CO2	If L(x,y) symbolises the statement "x likes y" where the universe of discourse for both x and y consists of all people in the world. Translate the following English sentences into logical expressions: (i)There is somebody whom everybody likes. (ii)There is somebody whom no one likes.	[AP]
CO3	Let X= {1,2,3,4} and R = {(x,y) / x > y}. Draw the graph of R and also give its matrix.	[AP]
CO4	From a club consisting of 6 men and 7 women, in how many ways can we select a committee of(a) 3 men and 4 women?(b) 4 persons which has at least one woman?(c) 4 persons that has at most one man?	[AP]
CO5	Use Euclidean algorithm to find a) gcd (1819,3587); b) gcd(12345,54321)	[AP]
CO6	Write an algorithm to traverse a binary tree in: In order.	[AP]

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4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :49

CO1	Write the dual of the statement $\neg(p \vee q) \vee [(\neg p) \wedge q] \vee p$	[AP]
CO2	Show that $\forall x(P(x) \rightarrow (Q(y) \wedge R(x))), \exists x P(x) \Rightarrow Q(y) \wedge \exists x(P(x) \wedge R(x))$	[AP]
CO3	Prove that the relation set inclusion $\subseteq$ is a partial ordering on any collection of sets.	[AP]
CO4	Determine whether the following posets are lattices:a){(1,3,6,9,12),D}, b){(1,5,25,125),D} If the poset is not a lattice, give reasons.	[AP]
CO5	Find the prime factorization of each of the following integer 6647	[AP]
CO6	Construct a binary search tree with the three-letter words hit, hat, cat, rat, sat, fat, mat, pat, kat.	[AP]

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Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :50

CO1	Translate the sentence into logical expression: If it snows tonight then I will stay at home. Also write its contrapositive.	[AP]
CO2	Show that the premises "One student in this class knows how to write programs in JAVA" and "Everyone who knows how to write programs in JAVA can get a high-paying job" imply the conclusion "Someone in this class can get a high-paying job".	[AP]
CO3	Rewrite each set using the listing method. i)The set of months that begin with the letter A. ii) The set of solutions of the equation x 2 - 5x + 6 - 0.	[AP]
CO4	Construct the Hasse diagram for the poset $(A, \mid)$, where $A = \{1, 2, 3, 6, 8, 12\}$ and $\mid$ denotes the divisibility relation.	[AP]
CO5	Determine if the positive integer is a prime- 1723	[AP]
CO6	How many vertices does a full 4-ary tree with 15 internal vertices have?	[AP]

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Nature of Course : Theory with Practical

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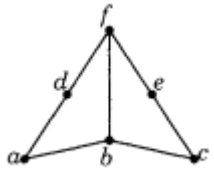
Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :51

CO1	Construct a truth table for $(p \rightarrow q) \wedge (q \rightarrow p)$.	[AP]
CO2	Establish the validity of the following arguments: All integers are rational numbers. Some integers are powers of 2. Therefore some rational numbers are powers of 2.	[AP]
CO3	Determine if the relation from {a,b,c,d} to {0,1,2,3,4} is a function R1={(a,0)(b,1),(c,0)(d,3)}	[AP]
CO4	Find the maximal and minimal elements in the poset in the Hasse diagram 	[AP]
CO5	Express the gcd of the given integer as a linear combination 28,15	[AP]
CO6	Rewrite the infix expression in prefix form. $a - \left(\frac{b}{c+d}\right)^{e} * f$	[AP]

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Nature of Course : Theory with Practical

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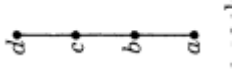
Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :52

CO1	Write the following statements in symbolic form “If either Pavithra takes calculus or Sharmila takes sociology then Malathy takes English”	[AP]
CO2	Express each of the following statements using mathematical and logical operations, predicates and quantifiers, where the universe of discourse consists of all computer science students / mathematics courses. (i)Every computer science student needs a course in mathematics.(ii) There is a student in this class who owns a personal computer.	[AP]
CO3	If R is the relation on the set of integers such that $(a,b) \in R$, iff $3a + 4b = 7n$ for some integer n, prove that R is an equivalence relation.	[AP]
CO4	Find the maximal and minimal elements in the poset with the Hasse diagram. 	[AP]
CO5	Express the gcd of the given integers as a linear combination of them 12,29	[AP]
CO6	$a + \frac{b}{c}\left(\frac{d+e}{f-g}\right) - h^i$ Rewrite the infix expression in prefix form.	[AP]

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Nature of Course : Theory with Practical

Course Objectives:

1	To study the concepts needed to test the logic of a program.
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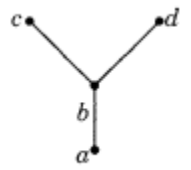
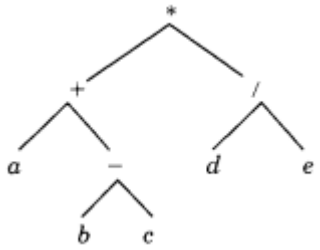
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :53

CO1	Obtain CNF of $p \wedge (p \rightarrow q)$	[AP]
CO2	Express each of the following statements using mathematical and logical operations, predicates and quantifiers, where the universe of discourse consists of all computer science students / mathematics courses. (i)Every student in this class has taken atleast one mathematics course.(ii)There is a student in this class who has taken atleast one mathematics course.	[AP]
CO3	Show that for any 2 sets A and B , $A - B = A \cap B^c$.	[AP]
CO4	Express the gcd of the given integers as a linear combination of them 18,28	[AP]
CO5	Find the maximal and the minimal elements in the poset in the Hasse diagram 	[AP]
CO6	Find the prefix expression represented by the binary expression tree. 	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

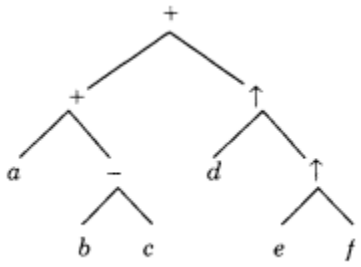
Course Objectives:

1	To study the concepts needed to test the logic of a program.
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

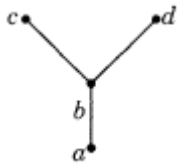
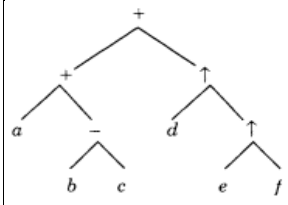
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :54

CO1	Prove that p , $p \rightarrow q$, $q \rightarrow r \Rightarrow r$	[AP]
CO2	Prove that $\forall x(p(x) \rightarrow (q(y) \wedge r(x)))$, $\exists x\, p(x) \Rightarrow q(y) \wedge \exists x(p(x) \wedge r(x))$	[AP]
CO3	Let f: R$\rightarrow$R defined by $f(x) = x^2 - 2$ then find f^{-1}.	[AP]
CO4	Find the prime factorisation of the following integer 10!	[AP]
CO5	State and prove Modular property for lattices.	[AP]
CO6	Find the prefix expression represented by the binary expression tree. 	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :55

CO1	Write the truth table for $p \wedge (\neg q \vee r)$	[AP]
CO2	Establish the validity of the following arguments: All integers are rational numbers. Some integers are powers of 2. Therefore some rational numbers are powers of 2.	[AP]
CO3	Give an example of a relation that is reflexive and symmetric but not transitive.	[AP]
CO4	Find the maximal and minimal elements in the poset with the Hasse diagram. 	[AP]
CO5	Find the prime factorization 586	[AP]
CO6	 Find the postfix expressions represented	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

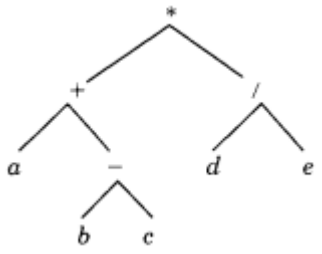
Course Objectives:

1	To study the concepts needed to test the logic of a program.
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :56

CO1	Determine whether the statement are logically equivalent a) $p \vee (p \wedge q)$ and p b) $\neg(p \wedge q)$ *and* $\neg p \wedge \neg q$ c) $p \vee t$ and t	[AP]
CO2	Negate the following statements (a) All chalkboards are black. (b No person has green eyes.	[AP]
CO3	Define Poset wth an example	[AP]
CO4	Construct the Hasse diagram for the poset (A, I), where A = { 1, 2, 3, 6, 8, 12} and I denotes the divisibility relation.	[AP]
CO5	Develop (3ABC)sixteen in base ten.	[AP]
CO6	Find the postfix expressions represented 	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

Course Objectives:

1	To study the concepts needed to test the logic of a program.
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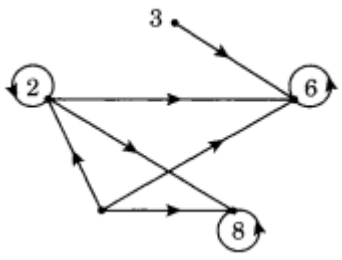
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :57

CO1	Determine whether the statement are logically equivalent a) $p \wedge t$ and t b) $p \wedge c$ and p $\vee$ c c) $(p \wedge q) \wedge r$ and p $\wedge$ (q $\wedge$ r)	[AP]
CO2	By indirect method of proof show that $(\forall x)(P(x) \rightarrow Q(x))$, $(\exists y)(P(y)) \Rightarrow (\exists z)(Q(z))$	[AP]
CO3		[AP]
CO4	Draw the Hasse diagram for the poset (A, $\subseteq$), where A denotes the power set of the set {a, b, c}.	[AP]
CO5	For any three sets A, B and C, Prove that $A \times (B \cup C) = (A \times B) \cup (A \times C)$ & $A \times (B \cap C) = (A \times B) \cap (A \times C)$.	[AP]
CO6	Find the indegree, outdegree, and degree of each vertex of the digraph in Figure Identify any source(s) and sink(s). 	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

Course Objectives:

1	To study the concepts needed to test the logic of a program.
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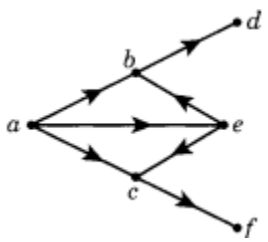
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :58

CO1	Write the truth table for $p \wedge (q \wedge r)$	[AP]
CO2	By indirect method of proof show that $(\forall x)(P(x) \rightarrow Q(x))$, $(\exists y)(P(y)) \Rightarrow (\exists z)(Q(z))$	[AP]
CO3	Identify the values of $\left\lfloor \frac{1}{2} \right\rfloor, \lceil 3.1 \rceil, \text{INT}(3.25), -30 \pmod 7$	[AP]
CO4	Determine if each is a partial order-The relation < on R	[AP]
CO5	Study the following number pattern and add two more lines. $1 \cdot 9+2 = 11$ $12 \cdot 9+3 = 111$	[AP]
CO6	Find the indegree, outdegree, and degree of every vertex in the graph. 	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
Course Objectives:		
1	To study the concepts needed to test the logic of a program.	
2	To learn the working on class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	
3	To use number theory in computer networks and security.	
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :59

CO1	Find negation of the proposition “Today is Monday”	[AP]
CO2	Show that the conclusion $\forall x(P(x) \rightarrow \neg Q(x))$ follows from the premises $\exists x(P(x) \wedge Q(x)) \rightarrow \forall y(R(y) \rightarrow S(y))$ and $\exists y(R(y) \wedge \neg S(y))$	[AP]
CO3	Use the definition of O-notation to show that $3x^3 - 1000x - 200$ is $O(x^3)$.	[AP]
CO4	Use mathematical induction to prove that $1 + 2 + \cdots + n = \frac{n(n+1)}{2}$ for all integers $n \geq 1$.	[AP]
CO5	Use the Euclidean algorithm to find gcd(330, 156).	[AP]
CO6	Complete the adjacency matrix of a relation on {a, b, c} in such a way that the relation has the given property. $\begin{bmatrix} - & 1 & 0 \\ 0 & - & 1 \\ 1 & 0 & - \end{bmatrix}$, reflexive	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4

Nature of Course : Theory with Practical

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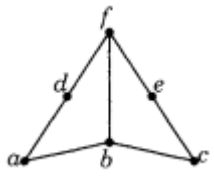
3	To use number theory in computer networks and security.
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.

Course Outcomes:
Upon completion of the course, students shall have ability to

CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :60

CO1	Determine whether the conclusion C follows from the premises $H_1 : \neg P, H_2 : P \Leftrightarrow Q \quad C : \neg(P \wedge Q)$	[AP]
CO2	Using indirect method prove that $\forall x(P(x) \vee Q(x)) \Rightarrow (\forall x P(x)) \vee (\exists x Q(x))$	[AP]
CO3	Compute $\lfloor x \rfloor$ and $\lceil x \rceil$ for each of the following values of x: a. 25/4 b. 0.999 c. −2.01	[AP]
CO4	Find the maximal and minimal elements in the poset with the Hasse diagram. 	[AP]
CO5	Find gcd(10^{20}, 6^{30}).	[AP]
CO6	Assuming that repetitions are not permitted, explain how many four-digit numbers can be formed form the six digits 1, 2, 3, 5, 7, 8 and how many of these numbers are less than 4000?	[AP]

22MAC01	DISCRETE MATHEMATICS (COMMON TO CSE,IT,AI&DS,CSE(AI&ML),CSE(CS),CSE(IOT))	2/1/2/4
Nature of Course : Theory with Practical		
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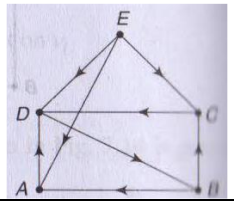
4	To acquire thorough knowledge of fundamental notions from lattice theory and properties of lattices.	
Course Outcomes: **Upon completion of the course, students shall have ability to**		
CO1	Utilize the concepts of logic to derive and prove the solution	[AP]
CO2	Identify and solve in terms of predicates and quantifiers	[AP]
CO3	Make use of the fundamental concepts of sets, relations, mathematical functions and all of its properties	[AP]
CO4	Apply discrete mathematics in formal representation of various computing constructs and algebraic structures	[AP]
CO5	Apply integrated approach to number theory.	[AP]
CO6	Make use of the concepts of combinatorics and Graph theory in the field of Computers	[AP]

Roll Number :61

CO1	Using indirect method of proof derive $p \to \neg s$ from the premises $p \to (q \vee r), q \to \neg p$, $s \to \neg r, p$	[AP]
CO2	Negate each quantified proposition. (1) Every computer is a 16-bit machine. (2) Some girls are blondes.	[AP]
CO3	Determine whether or not the following relation is a function. If the relation is a function, find its range.R_1={(x,y)|x ,y $\in$ Z, y= x^2 +7}, which is a relation from Z to Z.	[AP]
CO4	Apply lattices concepts to show that the diamond lattice M_5 is a modular lattice	[AP]
CO5	Apply Euclidean algorithm to find gcd(1819,3587)	[AP]
CO6	Find the indegree and out degree of each vertex of each of the following directed graph. Also verify that the sum of the in-degrees(or the out degrees) equals the number of edges. 	[AP]