1. First Day :-

1 : Generate Truth Table for the propositional value of p and q find the negation of p and q, conjunction ($p \wedge q$), disjunction ($p \vee q$), Exclusive OR($p \oplus q$), Conditional Statement ($p \rightarrow q$), Bi-conditional ($p \leftrightarrow q$) Statement.

2 : Given two bit strings of length n, find the bitwise AND, bitwise OR and bitwise XOR of these strings.

3 : Find the pair of (x,y) where $x^2+y^2=z^2$, z is given, x, y and z are integers. [Note: could you check $x^3+y^3=z^3$, have a solution where x, y and z are integers?]

2. Second Day :-

1 : Given two set A and B, a proposition p(x,y) where x e A and y e B, Find the propositional value of $\forall_x \forall_y p(x,y)$, $\forall_x \exists_y p(x,y)$, $\exists_x \forall_y p(x,y)$ $\exists_x \exists_y p(x,y)$.

2 : The 3x+1 Conjecture: Let T be the transformation that sends an even integer x to x/2 and an odd integer x to 3x + 1. A famous conjecture, sometimes known as the 3x + 1 conjecture, states that for all positive integers x, when we repeatedly apply the transformation T, we will eventually reach the integer 1. For example, starting with x = 13, we find $T(13)=3 \cdot 13 + 1 = 40$, $T(40) = 40/2 = 20$, $T(20) = 20/2 = 10$, $T(10) = 10/2 = 5$, $T(5) = 3 \cdot 5 + 1 = 16$, $T(16) = 8$, $T(8) = 4$, $T(4) = 2$,and $T(2) = 1$.

3. Third Day :-

1 : Find the following summation :

1. $\sum_{n=L}^{U} (a + nd)$ where L<U, given L, U, a & d.
2. $\sum_{j=L}^{U} ar^j$ where L<U, given L, U, a & r.
3. $\sum_{i=L}^{U} \sum_{j=L}^{U} (i + j)$ where L<U, given L & U.

2 : Find the value of the following series : $1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} +$ -------

4. Fourth Day :-

1 : Given two finite sets, list all elements in the Cartesian product of these two sets.

2 : Given a finite set, list all elements of its power set.

5. Fifth Day :-

1 : Given subsets A and B of a set with n elements, use bit strings to find A, $A \cup B$, $A \cap B$, $A \setminus B$ and $A \oplus B$.

2 : Calculate the value of Pi(π).

3 : Calculate the value of golden ratio.

6. Sixth Day :-

1 : Given an m × k matrix **A** and a k × n matrix **B**, find **AB**.

2 : Given a square matrix A and a positive integer n, find A^n.

3 : Given a square matrix, determine whether it is symmetric.

4 : Given two m × n Boolean matrices, find their meet and join.

7. Seventh Day :-

1 : Given two positive integers, find their greatest common divisor using the Euclidean algorithm.

2 : Given two positive integers, find their least common multiple.

3 : Given a positive integer, find the prime factorization of this integer.

4 : Given an m × k Boolean matrix A and a k × n Boolean matrix B, find the Boolean product of A and B.

5 : Given a square Boolean matrix A and a positive integer n, find A.

8. Eighth Day :-

1 : Given a positive integer, determine whether it is prime.

2 : Given a positive integer, determine whether it is Mersenne prime.

3 : The polynomial $f(n) = n^2-n+41$ has the interesting property that f(n) is prime for all positive integers n not exceeding 40. Given a positive integer n, find the value of f(n) whether f(n) is prime or not.

4 : Given an even integer n, find two prime numbers whether the sum of them is equal to n.

5 : Given an integer n, whether $f(n) = n^2+1$ is prime or not.

6 : Given a positive number n, whether it is prime or not. If n is prime, check whether n and n+2 are Twin primes or not.

7 : [Modular Exponentiation] Given the positive integers a, b, and m with m> 1, find a^b mod m.

9. Ninth Day :-

1 : Given a positive integer n and a non-negative integer not exceeding n, find the number of r-permutations and r-combinations of a set with n elements.

2 : Given positive integers n and r, find the number of r-permutations when repetition is allowed and r-combinations when repetition is allowed of a set with n elements.

3 : Given a sequence of positive integers, find the longest increasing and the longest decreasing subsequence of the sequence.