

**I/IV-B.Tech-(ODD Sem), Academic Year: 2023-2024**

**B. Tech. (AIDS,CSE,CSIT,ECE), 2023 Batch I/IV, ODD Semester**

**Subject Code: 23MT1002**

**TITLE: Discrete Structures**

**CO-1**

**TUTORIAL PROBLEMS**

**Tutorial-1**

* 1. **Find the power set of the following set. Set B = {1,2,3,4}**
  2. In a survey of 80 people, it was found that 35 people read newspaper H, 20 read newspaper T, 15 read the newspaper I, 5 read both H and I, 10 read both H and T, 7 read both T and I, 4 read all three newspapers. Find the number of people who read at least one of the newspapers?
  3. In a school, all pupils play either Hockey or Football or both. 400 play Football, 150 play Hockey, and 130 play both the games. Find

(i) The number of pupils who play Football only,

(ii) The number of pupils who play Hockey only,

(iii) The total number of pupils in the school.

* 1. How many natural numbers n ≤ 1000 are divisible by any of 2, 5 ?
  2. A large software development company employs 100 computer programmers. Of them, 45 are proficient in Java, 30 in C#, 20 in Python, six in C# and Java, one in Java and Python, five in C# and Python, and just one programmer is proficient in all three languages above.Determine the number of computer programmers that are not proficient in any of these three languages.

**TUTORIAL -2**

1. **Find the domain and the range of the real function, f(x) = 1/ (x + 3).**
2. Determine whether each of the following is a function with domain {1, 2, 3, 4}. If it is not a function explain, give reason.
3. R1= {(1, 1), (2, 1), (3, 1), (4,1), (3, 3)}
4. R2= {(1, 2), (2, 3), (4,2)}
5. R3= {(1, 1), (2, 1), (3, 1), (4,1)}
6. R4= {(1, 4), (2, 3), (3, 2), (4,1)}
7. Determine the domain and range of these functions:
8. The function that assigns to each pair of positive integers the maximum of these two integers
9. The function that assigns the last two bits of a bit string of length 2 or greater to that string.

4. Find the domain and range of these functions. Note that in each case, to find the domain, determine the set of elements assigned values by the function:

a) the function that assigns to each nonnegative integer its last digit

b) the function that assigns the next largest integer to a positive integer

c) the function that assigns to a bit string the number of one bit in the

string

* + - 1. the function that assigns to a bit string the number of bits in the string.

1. Find the inverse of the function f: R → R defined by f(x)=3x+5.
2. Find f◦g and g◦f, where f(x)= x2+1 and g(x)=x+2, are functions from R to R.
3. If   and , then find  and .

**Tutorial-3**

1. Examine whether the relation (x, y) ∈ R, if, x ≥ y defined on the set of +ve integers is a partial order relation.
2. Draw the Hasse diagram using the relation, “divisibility’ on the set {1, 2, 4, 8, 16, 32, 64}.
3. Draw the Hasse diagram using the relation, “less than or equal to” relation

on {0, 2, 5, 10, 11, 15}.

1. A relation R defined from a set A={2,3,4,5} to the set B={3,6,7,10} as follows If (X,Y) belongs to R then “X divides Y”. Write R as a set of ordered pairs and also find R-1.
2. Let S be the set of all lines in 3 dimensional space. A relation ’R’ is defined on S by “*l R m if and only if l lies on the plane of m” for l, m ∈ S*. Examine if R is (i) reflexive, (ii) symmetric,(iii) transitive. Give your conclusion.
3. Let R1 be the relation defined on the set of real numbers are such that as (a, b) belongs to R1 if and only if 1+ab > 0 for all (a, b) belongs to R1. Illustrate that R1 is reflexive, symmetric but not transitive.
4. Evaluate the following values