Name :- Aditya Gupta
Section :- B
Univ No :- 2215000094
Class-Roll No :- 47

Assignment-3

Poset and Lattices

Solution 1 :- **Reflexivity** :- for any integer x, $x \leq x$. This means that any integer less than or equal to itself.

Anti-symmetry :- for any integer x and y, if $x \leq y$ and $y \leq x$, then $x = y$, this means integers are equal to each other.

Transitivity :- for any integer x, y and z if $x \leq y$ and $y \leq z$, then $x \leq z$. if x is less than or equal to y and y is less than equal to z, then x is less than equal to z.

∴ The set of integers and relation "less than or equal to" satisfies all the conditions of partial order on this set ; so, it is a poset.

Solution 2 :- **Reflexivity** :- every task should be able to start before itself. for every task T, T should related to itself but task cannot start before itself, so it is not reflexivity.

Anti-symmetry :- Task X can start before task Y, Task Y can start before task X without them being identical.

∴ It is not satisfy the condition of reflexivity so it is not poset.

Solution 3) It forms a lattice, A lattice is a partially ordered set in which every pair of elements has both a least upper bond (Join) and a greatest lower bond (meet). In this case,

The LUB (Join) of two subsets A and B is their union. which is also a subset of original set S. These operations are exists.

Solution 4) In partially ordered set, not all ements are necessarily comparable. In this, not all Job position are directly comparable because some positions may be at the same level or have similar importance. So, it is a partially ordered set.

Solution 5) Set = {0, 1}

0 is less than or equal to 1 ; $0 \leq 1$

1 is greater than or equal to 0, $1 \geq 0$

For (meet) of two elements in the logical 'OR' operation for any x, y in {0, 1}, x∨y is LUB.

These operations satisfy the properties of lattice making {0,1} with AND, OR and also the complement of NOT.

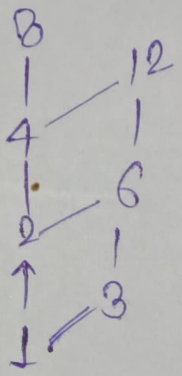
Answer 6:- Reflexivity:- In this case, everyone is older than themselves, However, this is not true since K is not reflexive.

Anti-Symmetry:- x is older than Y and Y is older than x, it implies x and y have the same age so $x=y$. It implies x and y have the same age $x=y$. It is anti-symmetric.

Transitivity:- x is older than Y and Y is older than Z, then, it follow x is older than Z It satisfies transitivity.

∴ K is not reflexive so, it cannot be consider as a partial ordering.

Solution 7) | a divides b | on {1, 2, 3, 4, 6, 8, 12}



Hasse Diagram.