



# SNS COLLEGE OF TECHNOLOGY

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## UNIT 5- LATTICES AND BOOLEAN ALGEBRA

## Lattices as algebraic systems

Bounded lattice:  
A lattice which has both ~~#~~ '0' element and '1' element is called an bounded lattice. It is denoted by  $(L, \wedge, \vee, 0, 1)$ .



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## Lattices as algebraic systems

Complement of an element:

In a bounded lattice  $(L, \wedge, \vee, 0, 1)$ , an elt.  $b \in L$  is called a complement of  $a \in L$ , if

$$a \wedge b = 0$$

$$a \vee b = 1$$

Complemented lattice:  $\wedge, \vee$

A lattice  $(L, \wedge, \vee, 0, 1)$  is said to be complemented lattice if every elt. of  $L$  has at least one complement.

Complete Lattice:

A lattice  $(L, \wedge, \vee)$  is said to be complete lattice if every non empty subsets of  $L$  has both G.L.B & L.U.B.

Eg:  $(P(A), \subseteq)$

Modular lattice:

A lattice  $(L, \wedge, \vee)$  is said to be modular lattice, if it satisfies the following condition

$$M_1: \text{If } a \leq c \text{ then } a \vee (b \wedge c) = (a \vee b) \wedge c, \forall a, b, c \in L.$$

1. Check the given lattice is the complemented lattice or not.

Now

$$a \wedge b = a \neq 0$$

$$a \vee b = b \neq 1$$

$\Rightarrow b$  is not the complement of  $a$ .

$$\text{and } b \wedge c = a \neq 0$$

$$b \vee c = 1$$

$\Rightarrow b$  is not the complement of  $c$ .

$\therefore$  It is not a complemented lattice.

