Branch : CSE/IT **Batch : Hinglish**

Discrete Mathematics

Set Theory

DPP-09

[MCQ]

1. The poset $[D_{12}; |]$ is

(a) a lattice.

(b) a join semi lattice but not a meet semi lattice.

(c) a meet semi lattice but not a join semi lattice.

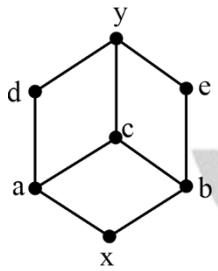
(d) not a semi lattice.

[MCQ]

2. Consider the Lattice.

L = {x, a, b, c, d, e, y} shown below.

Which of the following is a sub-Lattice of L?



(a) {x, a, b, y} (b) {x, a, e, y}

(c) {x, c, d, y} (d) {x, a, c, y}

[MCQ]

3. Which of the following statements is false, for the Lattice $[P(A); \subseteq]$

(a) The upper bound of $[P(A); \subseteq]$ is A.

(b) The lower bound of $[P(A); \subseteq]$ is $\varnothing$.

(c) The upper bound of $[N; \leq]$ does not exist, where N is set of all positive integers.

(d) The lower bound of $[N; \leq]$ is 0

[MCQ]

4. Which of the following is not true

(a) $[P(A); \subseteq]$ is a distributive lattice.

(b) In a distributive lattice if $b \wedge c = 0$ then $b \leq c$

(c) If L is a bounded distributive lattice, the complements are unique, if they exist.

(d) Every distributive lattice is a Complemented lattice.

[MCQ]

5. Which of the following posets is not a Lattice.

(a) $[\{1, 3, 6, 9, 12\}; |]$

(b) $[\{1, 5, 25, 125\}; |]$

(c) $[\{1, 2, 4, 8, 16\}; |]$

(d) $[Z; \geq]$

Answer Key

1. **(a)**
2. **(b)**
3. **(d)**
4. **(d)**
5. **(a)**

Hints and Solutions

1. (a)

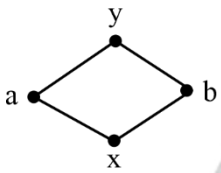
$D_{12} = \{1, 2, 3, 4, 6, 12\}$

If n is any +ve integer, then the poset $[D_n: |]$ is a lattice.

2. (b)

(a)

Let $L_1 = \{x, a, b, y\}$. The Hasse Diagram of L_1 is



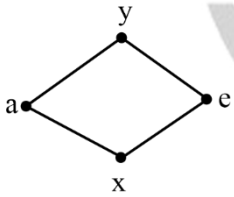
The lub of a and b in the given lattice = c

The lub of a and b in L_1 = y

$\therefore$ L_1 is not a sub lattice of L.

(b)

The Hasse diagram of $L_2 = \{x, a, e, y\}$ is

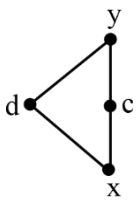


L_2 is a sub lattice of L

(c)

The Hasse diagram of the subset

$L_3 = \{x, c, d, y\}$ is shown below



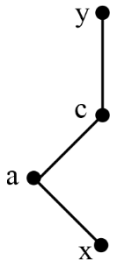
The glb of c and d in L = a

The glb of c and d in L3 = x

$\therefore$ L_3 is not a sublattice.

(d)

$L_4 = \{x, a, c, y\}$



L_4 is a totally ordered set.

L_4 is a sub lattice of L.

3. (d)

For the lattice $[P(A); \subseteq]$, the upper bound is A and lower bound is ϕ.

$\therefore$ Options (a) and (b) are true.

(c) $N = \{1, 2, 3, 4, ...\infty\}$

The upper bound is the largest positive integer which does not exist.

(d) $N = \{1, 2, 3, 4, ...\infty\}$

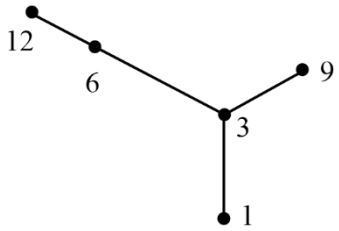
The lower bound of $[N; \leq] = 1$

4. (d)

$[N; \leq]$ is a totally ordered set and therefore a distributive lattice. But N is not a complemented lattice because the upper bound of the lattice does not exist.

5. (a)

The Hasse Diagram of the poset is



There are 2 maximal elements 9 and 12.

$\therefore$ lub of 9 and 12 does not exist.

Hence, the poset is not a lattice.