

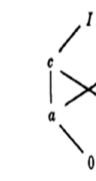
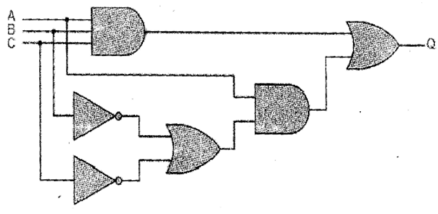


**B.Tech(2020-21)**  
**Discrete Structures and Theory of Logic(KCS 303)**  
**Assignment-5**

QNo.	Question	CO Type	Bloom's level
1	Prove that a lattice with 5 elements is not a boolean algebra.	CO3	L3
2	Show that in a complemented, distributive lattice, $a \leq b \Leftrightarrow a \wedge b' = 0 \Leftrightarrow a' \vee b = 1 \Leftrightarrow b' \leq a'$	CO3	L4
3	Let $(L, \vee, \wedge, \leq)$ be a distributive lattice and $a, b \in L$ . if $a \wedge b = a \wedge c$ and $a \vee b = a \vee c$ then show that $b = c$ .	CO3	L3
4	Describe the Boolean duality principle. Write the dual of each Boolean equations:  1. $x + x'y = x+y$ 2. $(x.1)(0+x') = 0$	CO3	L3
5	Draw the Haase diagram of $\langle P(a, b, c), \leq \rangle$ . Find greatest element, least element, minimal element and maximal element.	CO3	L3
6	Simplify the following Boolean function using three variables maps:  1. $f(x,y,z) = \sum(0, 1, 5, 7)$ 2. $f(x,y,z) = \sum(1, 2, 3, 6, 7)$	CO3	L3
7	Answer these questions for the poset $\langle \{3, 5, 9, 15, 24, 45\},   \rangle$ . (i) Find the maximal elements. (ii) Find the minimal elements. (iii) Is there a greatest element? (iv) Is there a least element? (v) Find all upper bounds of $\{3, 5\}$ . (vi) Find the least upper bound of $\{3, 5\}$ . (vii) Find all lower bounds of $\{15, 45\}$ . (viii) Find the greatest lower bound of $\{15, 45\}$ , if it exists.	CO3	L4
8	Which of the partially ordered sets are lattices?  <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>i.</p> </div> <div style="text-align: center;">  <p>ii.</p> </div> <div style="text-align: center;">  <p>iii.</p> </div> </div>	CO3	L3
9	Distinguish between bounded lattice and complemented lattice.	CO3	L2
10	Show that the "greater than or equal" relation ( $\geq$ ) is a partial ordering on the set of integers.	CO3	L2
11	In a Lattice if $a \leq b \leq c$ , then show that (i) $a \vee b = b \wedge c$ (ii) $(a \vee b) \vee (b \wedge c) = (a \vee b) \wedge (a \vee c) = b$	CO3	L3
12	Prove that every finite subset of a lattice has an LUB and a GLB.	CO3	L2
13	Give an example of a lattice which is a modular but not a distributive.	CO3	L2
14	Find the Boolean algebra expression for the following system.  	CO3	L4
15	Let L be a bounded distributed lattice, prove if a complement exists, then it is unique. Is D(12) a complemented lattice?	CO3	L4