Ajay Kumar Garg Engineering College, Ghaziabad

Department of MCA
Sessional Test-2

Course:	MCA	Semester:	I
Session:	2017-18	Section:	MCA-1
Subject:	Discrete Mathematics	Sub Code:	RCA-103
Max Marks:	50	Time:	2 hour

Note: Answer **all** the sections.

Section-A

A. Attempt **all** the parts. (5 X 2 = 10)
1. Define lattice. Also draw a lattice which is bounded, complemented and distributed.
2. Define GLB and LUB.
3. Explain the bounded lattice with an example.
4. Define complete DNF with example.
5. Write a Boolean expression of three variables which value is always 1.

Section-B

B. Attempt **all** the parts. (5 X 5 = 25)
6. Draw a Hasse diagram for the poset S= { 2, 3, 6, 12, 18, 36, 72, 108} under the relation of divisibility. Also find Supremum and Infimum for the subset B= {6,12,18}.
7. The complement of an element a in a bounded distributive lattice, if it exits, is unique.
8. Obtain the disjunctive normal form of the following Boolean expression:
$$(x + y')(y + z')(z + x')$$
9. If $(B, +, \cdot, ', 0, 1)$ is a Boolean algebra and $a,b \in B$ then prove that
$$(a + b)' = a' \cdot b' \text{ or } (a \vee b)' = a' \wedge b'$$
10. Define algebraic definition of lattice and Boolean algebra. Also define relationship between Boolean algebra and lattice.

Section-C

C. Attempt **all** the parts. (2 X 7.5 = 15)
11. Let $S = \{ a, b, c\}$ and $A = P(S)$ the power set of S. Draw Hasse diagram of the poset A with the partial order $\subseteq$ (set inclusion). Find Least & Last elements and upper bound, lower bound, least upper bound, greatest lower bound for the subset S of set A. Also verify that the Hasse diagram is lattice or not.
12. Simplify the Boolean expression $f(w, x, y, z) = \Sigma m(0, 1, 3, 5, 8, 10, 13, 15)$ by using K-map. Also draw the Logic diagram of the simplified expression.