AJAY KUMAR GARG ENGINEERING COLLEGE, GHAZIABAD
DEPARTMENT OF IT/CSE

SESSIONAL TEST -2

Course: B.Tech
Session: 2017-18
Subject: Discrete Structure & theory of logic
Max Marks: 50

Semester: III
Section: IT-1, 2, CS-1, 2, 3
Sub. Code: RCS-301
Time: 2 hours

SECTION A

A. Attempt **all** the parts. (5*2=10)

(1). Prove that a ring R is commutative if and only if $(a+b)^2=a^2+2ab+b^2 \forall\ a, b \in R$

(2). Distinguish between bounded lattice and complemented lattice.

(3). Let G= {1, -1, i, -i}, find order and sub group of each elements.

(4). Let G be the set of all non-zero real number and let a*b= ab/2.

Show that (G,*) be an abelian group.

(5). Define ring and give an example of a ring with zero-divisors.

SECTION B

B. Attempt **all** the parts. (5*5=25)

(6). Let G be a group and a, b be elements of G. Then Show that:

(i) $(a^{-1})^{-1} = a$ (ii) $(ab)^{-1} = b^{-1} a^{-1}$

(7). Consider the group G = {1, 2,3,4,5, 6} under multiplication modulo 7

(i) Find the multiplication table of G

(ii) Find 2^{-1}, 3^{-1}, and 6^{-1}

(iii) Find order and subgroups generated by 2 and 3

(iv) Is G is cyclic?

(8). The order of each subgroup of a finite group is divisor of the order of the group.

(9). Draw Hasse-diagram to illustrate the following partial ordering

(i) The set of all sub set of { 1, 2, 3, 4} having at least two numbers partially ordered by $\subseteq$

(ii) The set of all sub set of { 1, 2, 3, 4} having at most two numbers partially denoted by $\supseteq$

(10). Prove that the set S= {0,1, 2, 3} forms a Ring under addition and multiplication modulo 4 but not a Field.

SECTION C

C. Attempt **all** the parts. (7.5*2=15)

(11). Simplify the following Boolean expression using K-map:

(i) Y= ((AB)'+A'+AB)'

(ii) A'B'C'D'+A'B'C'D+A'B'CD+A'B'B'CD'

(12). Prove that every cyclic group is an abelian group.

(i) Obtain all distinct left co-sets of {(0), (3)} in the group ($Z6$, $+_6$) and find their union.

(ii) In a lattice if $a \leq b \leq c$, then show that:

a) $a \vee b = b \wedge c$

b) $(a \vee b) \vee (b \wedge c) = (a \vee b) \wedge (a \vee c) = b$