### Bharati Vidyapeeth’s

### Institute of Computer Applications and Management

### A-4, Paschim Vihar, New Delhi-63.

### MCA – 1st Semester

### First Internal Discrete Maths(MCA-107)

*Note: Answer all Questions*

*Max. Marks: 45 Max. Time: 02 Hrs.*

Section A (compulsory) (5\*4)

Q1

1) Suppose that a connected planar graph has 20 vertices each of degree 3 .In how many regions this planar graph split the plane.

2) Prove by mathematical induction that for every positive integer n >=1, (3n +7n – 2) is divisible by 8

3) Show that the 4 fourth roots of unity form a group with respect to multiplication.?

4) Construct the binary tree whose in order and pre order traversals are EACIFHDBG and FAEICDHGB respectively.

5) Let L be a lattice then for all a,b,c,d in L show that (avb)=b if and only if a<=b

Unit 1

Q2

1) In a group of 20 adults there are 8 females, 9 literate and 6 female literate. Find number of male literate 5

2) If R is the relation on the set of positive integers such that (a,b) belongs to r if and only if a 2 + b is even, prove that R is an equivalence relation.

5

OR

Q3

1) Investigate the validity of preposition pV (q🡪p),~p r |- ~q 5

2) Find the transitive closure of the following relations given in matrix form using warshal’s algorithm

1 0 0 1 0

0 1 0 0 0

0 0 0 1 1

1 0 0 0 0 5

Unit 2

Q4

1. Simplify the following Boolean expression using K-map

x’z’ + y’z’ + yz’+ xyz

1. Let L is a distributive lattice. Show that if there exists an a with

a x=a y and a v x = a v y then x=y 5

OR

Q5

1. Express the following using principle DNF and CNF form

F(a,b,c) = (a’+b)’ + a’c 5

1. Find the reccurance relation a n+1 – a n = 3n2 – n ; n>=0 5

Q6 (compulsory)

4) A lattice is said to be modular if, for all a,b and c, a<=c => a v (b  c) =(a v b)  c. Show that a distributive lattice is modular. Further show that the lattice shown in the following hasse’s diagram is a non distributive lattice and is modular. 5