Roll No. .... **Total Pages : 04**

BT-3/D-19 **33003**

DISCRETE STRUCTURE

CSE-205E

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) Let P, Q and R are three finite sets. Then prove that $|P \cup Q| = |P| + |Q| - |P \cap Q|$. Also draw Venn diagram. **10**

(b) Among the first 500 positive integers :

(i) Determine the integers which are not divisible by 2, nor by 3, nor by 5.

(ii) Determine the integers which are exactly divisible by one of them. **10**

2. (a) Let $X = \{1, 2, 3, 4, 5, 6\}$ and R be a relation defined as $\{x, y\} \in R$, if and only if $x - y$ is divisible by 3. List the elements of Relation R. **10**

(b) Prove that :

(i) $A \cup (A \cap B) = A$

(ii) $(A \cup B) \cap C = (A \cap C) \cup (B \cap C)$. **2×5=10**

Unit II

3. (a) In a shipment, there are 50 floppy disks of which 5 are defective. Determine :

(i) In how many ways can we select 5 floppy disks ?

(ii) In how many ways can we select 5 non-defective floppy disks ?

In how many ways can we select 5 floppy disks containing exactly 3 defective floppy disks ? **10**

(b) How many permutations can be made out of the letters of word "COMPUTER" ? How many of these :

(i) Begin with C

(ii) End with R

(iii) Begin with C and end with R

(iv) C and R occupy the end places. **5×2=10**

4. (a) Determine which propositions are the following by constructing Truth Tables :

(i) $(p \to (q \to r)) \to ((p \to q) \to (p \to r))$

(ii) $(p \leftrightarrow q) \to ((p \wedge q) \vee (\sim p \wedge q))$. **2×5=10**

(b) (i) Differentiate Homogeneuous solutions and Particular solution with example.

(ii) From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done ? 2×5=10

Unit III

5. (a) Consider an algebraic system (G, *), where 'G' is the set of all non-zero real numbers and '*' is a binary operation defined by $a*b = ab/4$. Show that (G, *) is an Abelian group. 10

(b) Let (I, +) be a group, where I is the set of all integers and '+' is an addition operation. Determine whether the following subsets of G are sub-groups of G :

(i) The set G_1 of all odd integers

(ii) The set G_2 of all positive integers. 10

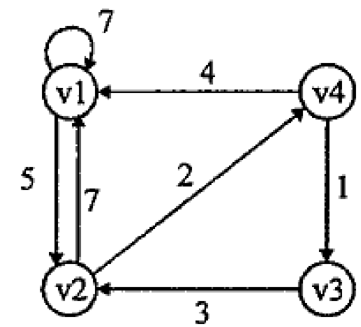
6. (a) Explain Langrange's theorem. 10

(b) Consider an algebraic system (N, +), where N = {0, 1, 2, 3,.....} and '+' is an addition operation. Determine whether (N, +) is a monoid or not. 10

http://www.kuonline.in

Unit IV

7. (a) Write Warshall's algorithm and apply this algorithm for the following graph to find the shortest paths for all pairs. 10



(b) Write Prim's algorithm for finding minimum spanning tree with example. 10

8. Differentiate between the following with example :

(a) Euler Circuit and Hamiltonian Circuit

(b) Plannar Graph and Bipartite Graph

(c) Cut-set and Bridges

(d) Graphs and Tree. 4×5=20

http://www.kuonline.in