13900673

EH-50

B.E. II Semester (CGPA) CSE Exam. 2014

DISCRETE STRUCTURE

Paper : CS-205

Time Allowed : Three Hours

Maximum Marks : 60

Note : Attempt all the questions.

All questions carry equal marks.

Q.1. a) Let N = {0, 1, 2, 3, ...}. Define functions f, g and h from set N to N by

$f(n) = n + 1$

$g(n) = 2n$

$$h(n) = \begin{cases} 0 \text{ if } n \text{ is even} \\ 1 \text{ if } n \text{ is odd} \end{cases}$$

Compute go(fog)oh. Is the function h is inversible? Is the function f is onto?

b) Prove that every transposition (x, y) is its own inverse. That is $(x\ y)^{-1} = (x\ y)$

OR

a) Prove that if $f: A \to B$ and $g: B \to C$ are surjections, then g of $f: A \to C$ is a surjection.

b) Two finite sets have x and y number of elements. The total number of subsets of the first set is four times the total number of subsets of the second set. Find the value of $x-y$.

Q.2. a) Determine whether the following statements are tautologies?

i) $r : (p \wedge \sim q) \vee (q \wedge \sim p)$

ii) $(p \to q) \vee (q \to p)$

b) Write a short note (300 words) on "Proof Systems"

OR

a) Prove that "If $x, y \in z$ (set of integer) such that xy is odd then both x and y are odd, by proving its contra positive.

b) Use mathematical induction to prove that $2^n < n!$ for every positive integer n with $n \geq 4$.

Q.3. a) Prove that Intersection of two sublattices is a sublattice.

b) If L and M are two distributive lattices then $L \times M$ is also distributive.

OR

a) [illegible] b.

b) Explain Hasse diagram with its properties. If N be a positive intege: and D_N denote the set of all divisions of N. Consider th partial order 'divides' in D_N. Then draw the Hasse diag am for D_{30}.

Q.4 a) Prove that a su ogroup H of a group G is normal iff

$$g^{-1}hg \in H \ \forall \ h \in H,\ g \in G.$$

b) For any a, x in group, show that $(x^{-1}ax)^n = x^{-1}a^nx$ where n is a positive nteger

OR

a) If G is a finite roup and H is a subg oup of G then $O(H)$ divides $O(G)$. agrange's Theorem)

b) Prove that a B olean ring is commutative

Q.5 a) State generali ed pigeonhole principle. Find ${}^{9}P_{1}$ and [illegible]. How many thr e digit numbers can be formed using 1, 2, 3, 4, 5?

b) Define tree. P ove that a tree of a connected graph has no circuit.

OR

a) Write Prim's lgorithm.

b) Prove that a c mplete graph of five vertices is non planar.

i) Define Hamiltonian walk with an exam ple.

ii) Relationship between permutation anc combination can be expressed as ________.

iii) Define modulus function with an exam ple.

iv) If A and B are finite sets then $A \cup B$ and $A \cap B$ are also finite and $n(A \cup B)$ = _____ + _____ – _____

v) State Inclusion - Exclusion principle.

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