Exam no______

Kadi Sarva Vishwavidyalaya,Gandhinagar

MCA(Sem-I), ATKT Examination

MC-04, Discrete Mathematics

Date: 12/04/11 Time: 3hrs Total Marks: 50

Q1(Compulsory question): [10]

(a) Let G be a group and let a,b€ G, then prove the Rule of Reversal given as $(a*b)^{-1} = b^{-1} * a^{-1}$

(b)Find the SOP, POS for the prepositional form of
$$(q \vee (p \wedge r)) \wedge ((p \vee r) \wedge q)'$$

(c)Find the number of ways of selecting 4 letters from the word 'PRINCIPAL'

(d)Define a spanning and an induced graph with example

(e)There are three sections in a question paper; each section has 5 question.A candidate has to solve in all 5 questions, choosing atleast one question from each section.In how many ways can the candidate make his choice?

Q2(Compulsory question): [5]

(a)Show that the set G={ 1,w,w^2} where w is an imaginary cube root of unity *is a group* wrt multiplication

(b) Prove the set P of all permutations of n symbols is a finite group of order n wrt binary operation of composition of permutation [5]

Or

(b)Define Isomorphism and check whether (S_4,D) and (S_{25},D) are isomorphic to each other [5]

Q3(a)Construct a FSM that works as a language recognizer that gives an output 1 if and only if the last three bits received are all 1's [5]

(b)Draw the Hasse diagram of (S_{72} , D) and check whether it is a lattice . [5]

Or

Q3(a) Minimize the Boolean expression given by the function using Karnaugh maps F(p,q,r,s)=$\sum$(0,3,4,5,7) [5]

d(p,q,r,s)=$\sum$(8,9,10,11,12,13,14,15)

(b)Let X={1,2,......10}and Let a fuzzy set A is given by

A={(2,0.3),(4,0.6),(5,0.7),(7,1),(6,0.5),(7,0.8),(8,0.7)}

Find the intersection and union of the complements of the fuzzy set given above [5]

Q4(a) Define the following terms: [5]

(i)Sub graph (ii) Degree of a graph (iii) Abelian group (iv) Elementary Path (v) Bounded lattice

(b)Find a non-empty set and a relation on the set that satisfy the property that it is Reflexive and symmetric but not transitive. [5]

Or

Q4(a) If A and B are equivalence relations on the set X ,prove that A$\cap$B is an equivalence relations [5]

(b) Prove the following Statement formula is tautology using truth table as well as using properties of logical connectives: [5]

$(\sim p \wedge q) \rightarrow (\sim (q \rightarrow p))$ (2)$(p \rightarrow q) \rightarrow (\sim q \rightarrow \sim p)$

Q5(a) If $(L, \leq)$ is a lattices then show that (1) $a \oplus (b * c) \leq (a \oplus b) * (a \oplus c)$
(2) $a * (b \oplus c) \geq (a * b) \oplus (a * c)$ [5]

(b) If every element of a group $(G,*)$ is its own inverse, then G is abelian, or if G be a group with identity e and if $a^2 = e$ for all $a \in G$, then G is abelian. [5]

Or

Q5(a) Construct a FSM that output 1 when it sees 101 and thereafter, and outputs 0 otherwise. [5]

(b) Obtain the simplified expression in Sum of Product
$F(A,B,C,D)= \sum(7,13,14,15)$ [5]

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