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Name ....

Reg. No. ....

THIRD SEMESTER B.TECH (ENGINEERING) DEGREE EXAMINATION, NOVEMBER 2012

CS/IT 09 304 – DISCRETE COMPUTATIONAL STRUCTURES

(2009 Admissions)

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*

1. What do you mean by quantifiers?
2. Explain equivalence relation.
3. Explain inverse functions.
4. Define Generator matrices.
5. Solve following recurrence relations. Assume *n* is even: $T(n)=T(n-2)+1$, $T(0)=1$

(5x2=10 marks)

Part B

Answer any **four** *questions*

Each question carries 5 marks

6. Show that $\{\uparrow\}$ is a minimal functionally complete set.
7. If the premises P,Q and R are inconsistent prove that $\neg R$ is a conclusion from P and Q.
8. Given an example of a relation which is symmetric, transitive but not reflexive on $\{a,b,c\}$
9. State and prove Lagranges Theorem
10. Show that $Z_7=\{(1,2,3,4,5,6), * \bmod 7\}$ is cyclic group.
11. Show that group homomorphism preserves, identity, inverse and Subgroup

(4x5=20 marks)

Part C

Answer section (a) **or** *section (b) of each question.*

12. a) (i) Check the validity of the following argument. "If the band could not play rock music or the refreshments were not delivered on time, then the New year's party would have been cancelled and Alice would have been angry. If the party were cancelled, then refunds would have to be made. No refunds were made".

(ii) Show that $R \vee S$ follows logically from the premises

$$C\vee D, (C\vee D)\to\neg H, \neg H\to(A \wedge\neg B) \text{ and } (A\wedge\neg B)\to(R\vee S).$$

Or

b) (i) Translate the following predicate calculus formula into English sentence

$\forall x[C(x)\vee\exists y(C(y)\wedge F(x,y))]$. Here C(x) : x has a computer, F(x ,y) : x and y are friends. The universe for both x and y is the set of all students of your college.

(ii) Check whether the hypothesis " It is not sunny this afternoon and it is colder than yesterday", " we will go swimming only if it is sunny" , "If we do not go swimming then we will take a canoe trip" and " If we take a canoe trip, then we will be home by sunset" lead to the conclusion "we will be home by sunset".

13. a) i)Find the number of symmetric relations that can be defined on a set with n elements

ii)Using adjacency matrix, find the number of different reflexive relation on a set A with n-element.

Or

b) Let G be a (p, q) graph. Let *M* be the maximum degree of the vertices of G and let *m* be the minimum degree of the vertices of G. Show that $m \leq \frac{2q}{p} \leq M$.

14. a) Let (G ,H , *) be a group and a $\in$ G,. Let f : G $\rightarrow$ G be given by f(x) = $a*x*a^{-1}$ for every x $\in$ G prove that f is an isomorphism of G onto G.

Or

(b) Let G be the set of all 2*2 matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$, where a,b,c,d are real numbers, such that (ad-bc)≠0.Show that set G with matrix multiplication binary operation forms the group. Let H=$\begin{pmatrix} a & b \\ 0 & d \end{pmatrix}$, be the set of 2*2 matrix where a,b,c,d are real numbers such that ad≠0.Prove that H is a subgroup of G.

15. a) Show that $1.2.3+2.3.4+3.4.5+\ldots+n(n+1)(n+2)=\frac{n(n+1)(n+2)(n+3)}{4}, n\geq 1.$

Or

b) Using generating function, solve f(n)=f(n-1)+f(n-2);f(0)=1,f(1)=1.

(4x10=40 marks)