D 10833   (Pages : 2)   Name...................................

Reg. No.............................

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, JANUARY 2011

Computer Science

CSCI C 01—DISCRETE MATHEMATICS

(2010 admissions)

Time : Three Hours————————————————————   Maximum Weightage : 36

I. Answer all questions. 12 x1 = 12 weightage.

1. Write down the negation of the proposition for every number x there is a number y such that y<x.

2. What is the bit string corresponding to the difference of two sets. Use it to find A-B where A = {2,3,5} and B={3,5}.

3. If A, = [0,i] *where* 1E2, the set of integers find $A_2 \cup A_4$ and $A_3 \cap A_4$.

4. Let A= {1,2} and B={a,b}. Find all function f:A→B and for each such function determine whether it is one to one , on to, both or neither.

5. Find the order of every element in the multiplicative group G={a,a2,a3,a4,a5,a6=e}.

6. Draw the transition diagram of finite state automata A that accept even .number of a's over {a,b}.

7. Let V={S}, T={0,1}and P={S→11S, S→0}Find L(G), give its verbal description.

8.. Give example for a relation which is

   a... Reflexive and transitive .but not symmetric

   b. Symmetric and transitive but not reflexive

9. 40 computer programmers interviewed for a job. 25 knew Java, 28 knew oracle, and seven knew neither language. How many knew both languages?

10. Determine, whether the relation S={(a,b):a≥b}on the set R of real numbers is an equivalence relation.

11. Assume the value of p→q is false. Determine the value of (pV q) →q.

12. Show that (pVq) Λ (pΛ q) is a contradiction.

II. Answer any six questions. 6 x 2 =12 weightage.

13. Prove that A-(B∩C)=(A-B)U(A-C).

14. If the function f:R→R defined by f(x)={3x-4 x>0; -3x+2 x5 0 determine

   a. f(0),f(2/3), f(-2)

   b. f-1(0),f-1(2),f-1(-7)

15. If in a ring R with unity $(xy)^- = x^- y^-$ for all x,yϵR then R is commutative.

Turn over

16. Define the following with example

    • a. Ring
    b. Group

17. Show that D_{30} is finite Boolean algebra under partial order of divisibility.

18. Prove that $p\leftrightarrow q \wedge (p\vee q)\to(p\wedge q)$ using

    a. Truth table

    b. Algebra of proposition

19. Find the particular solution of difference equation

$$a_{r+2}+a_{r+1}+a_r=r2$$

20. Show that propositions $q\to p$ and $p\to$ is not equivalent to $p\to q$.

21. Show that in any room of people who have been doing handshaking there will always be at least two people who have shaken hands the same number of times.

III. **Answer any three questions. 3 x 4 = 12 weightage.**

22. Find how many integers between 1 **and** 60 that are not divisible by 2 nor by 3 and nor by 5. Also determine the number of integers divisible by 5 not by 2, not by 3.

23. Prove that the fourth root of unity 1, -1,1, -I form an **abelian** multiplicative group.

24. Let R41,2),(2,3), (3,1)} and A={1,2,3} find the reflexive, symmetric and transitive closure R.

25. Solve the recurrence relation $y_{k+1}-5y_k=5$ satisfying the initial condition $y_0=3$.

26. Define finite state machine with example. Design a finite state machine that performs serial addition.

27. Explain the following with example

        a: Lattices, distributive and **complemented** lattices.

        b. Principle of duality.