SATHYABAMA UNIVERSITY
(Established under section 3 of UGC Act, 1956)

Course & Branch: B.E – CSE
Title of the paper: Discrete Mathematics
Semester: V | Max. Marks: 80
Sub.Code: 11503 (2002/2004/2005) | Time: 3 Hours
Date: 26-04-2008 | Session: AN

PART – A (10 x 2 = 20)
Answer All the Questions

1. Define, convictive normal form, with an example.

2. Using truth table, show that $(P \rightarrow Q) \rightarrow P \rightarrow (P \wedge Q)$.

3. Define infective formentum with an example.

4. What do you understand by minsets?

5. State Cayley's theorem in group theory.

6. Write the siffix expression of a + (b/c) * d.

7. Mention any 2 properties of lattices.

8. Briefly discuss partial ordering.

9. Define binary complete tree.

10. Define connectivity matrix of a switching.

PART – B (5 x 12 = 60)

Answer All the Questions

11. (a) Show that $(x)(P(x) \vee Q(x)) \Rightarrow (x)P(x) \vee (\exists x)Q(x)$.

(b) Write the conjunctive normal form of $\urcorner(P \vee Q) \leftrightarrow (P \wedge Q)$

(or)

12. (a) Show that the following premises are in consistent. $E \rightarrow S$, $S \rightarrow H$, $A \rightarrow \urcorner H$. and $E \wedge A$.

(b) Show that $((P \vee \urcorner P) \rightarrow ((P \vee \urcorner P) \rightarrow R) \Rightarrow Q \rightarrow R$, Without using truth table.

13. (a) For any three sets A, B, C show that (A + B) + C = A + (B + C), where + is the Booleam sum of two sets.

(b) Let $f: X \rightarrow Y$ and $g: Y \rightarrow X$. Then the function g is equal to f^{-1} if and only if $g \circ f = I_x$ and $f \circ g = I_y$ where I_H stands for identity function defined on the set H.

(or)

14. (a) Show that equivalence relation defined on any set, partitions that set uniquely with respect to that relation.

(b) Define transitive closure of a relation R in a finite set X is transitive Also for any other transitive relation P in X such that $R \subseteq p$, $R+ \subseteq P$ and in this case, R + is the smallest transitive relation containing R.

15. (a) State and prove lagrange's theorem in group theory.

(b) Define monoid. Justify whether set of m x n matrices with elements form the set of real numbers form a monoid under matrix addition. Give reason to justify your comment and also show that for any commutative monoid (m, *), the set of all idempotents of M forms a subimonoid.

(or)

16. (a) Define semigroup, concatenation and show that for any ser V, which is finite set of alphabelts, (V+, o) is a semi group, where O is a concatenation operator of any two strings of alphabets.

(b) If in a group G, $a^2 = e$ for every ‘a’ in G, then show that G is abelian

17. (a) Show that $x \leq 2^n$, $n \geq 0$ using mathematical induction.

(b) Solve the recursence relations $s(k) - 10S(k-1) + 9s(k-2) = 0$, $s(0) = 3$, $s(1) = 11$.

(or)

18. (a) Discuss in detail the properties of lattices.

(b) Minimize the Boolean function by the karnaugh mapping method. $B'C + B'D + A'C + AD'$.

19. (a) Define the radius, diameter and centre of a fraph. Show that every tree has a centre consisting of either one point or two non adjacent points.

(b) Define the concepts connectedness, unilaterally connectedness strougly connectedness of a directed graph D which of these define an equivalence relation on the matex set of D?

(or)

20. (a) Explain the following problem in terms of graphs.

(i) the four whour problem

(ii) Euler’s konigsbrg problem.

(b) Define isomorphism of two diagraphs and give examples that

(i) two diagraphs are isomorphism

(ii) nonsomorphic diagraphs also show that sum of all indegres of diagraphs is equal to sum of all outdegrees of that graph, which is equal to number of links of that diagraph.