Anna University, Chennai Nov/Dec 2012 Examinations
Important Questions
MA2265 Discrete Mathematics
V Sem CSE

1. Without constructing truth table obtain PCNF of $(p \to (q \wedge r)) \wedge (\neg p \to (\neg q \wedge \neg r))$ and hence find pdnf.
2. Using CP or otherwise obtain the following implication. $\forall x(p(x) \to Q(x); \forall x(R(x) \to \neg Q(x)) \Rightarrow \forall x(R(x) \to \neg P(x)$
3. Show that $(\neg p \wedge (\neg q \wedge r)) \vee (q \wedge r) \vee (p \wedge r) \Leftrightarrow r$
4. Find PCNF and PDNF for $(p \wedge q) \vee (\neg p \wedge q) \vee (q \wedge r)$
5. Prove that $[(p \vee q) \wedge (p \to r) \wedge (q \to r)] \to r$ is a tautology
6. Show that $(x)(P(x) \to Q(x)) \wedge (x)(Q(x) \to R(x)) \Rightarrow (x)(P(x) \to R(x))$
7. Prove that $8^n - 3^n$ is a multiple of 5 using mathematical induction
8. Using mathematical induction show that $2^{n+2} + 3^{2n+1}$ is divisible by 7, $n \geq 0$.
9. Solve s(k) – 10 s(k-1) + 9 s(k-2) = 0 with s(0) = 3 , s(1) = 11.
10. Show that $1.2.3 + 2.3.4 + 3.4.5 + \ldots + n(n+1)(n+2) = \frac{n(n+1)(n+2)(n+3)}{4}, n \geq 1.$
11. Using generating function method to solve the Fibonacci series
12. If G is a simple graph with n vertices and k components, then the number of edges is at most $(n-k)(n-k+1)/2$
13. A connected graph G is Eulerian if and only if every vertex of G is of even degree
14. Prove that if a graph G has not more than two vertices of odd degree, then there can be Euler path in G
15. Check the given graph is strongly connected, weakly connected and unilaterally connected or not. If G is a simple graph with n- vertices and k- components then the no.of edges is atmost $\frac{(n-k)(n-k+1)}{2}$
16. State and prove Lagrange's theorem
17. Let G be a group and a $\in$ G.Show that the map f : G □G defined by f(x) = a x a^{-1} for every $x \in$ G is an isomorphism.
18. If H is a group of G such that $x^2 \in H \forall x \in G$, Prove that H is normal subgroup of G
19. State and prove Fundamental theorem on homomorphism of groups
20. Prove that every finite group of order n is isomorphic to a permutation group of degree n.
21. Establish De.Morgan's laws in a Boolean Algebra
22. State and prove distributive inequalities of a Lattice
23. Show that every distributive lattice is modular. Whether the converse is true?
24. In a distributive lattice prove that a *b = a * c and a □ b = a □ c implies that b = c
25. In a Boolean Algebra, show that $(a\bar{b}) + (b\bar{c}) + (c\bar{a}) = (\bar{a}b) + (\bar{b}c) + (\bar{c}a)$