

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.E(IT) II/IV I Sem (Suppl) Examination May – Jun 2016

Discrete Structures

Time: 3 Hours

Max Marks: 75

Note: Answer all questions from **Section-A** at one place in the same order
 Answer any **five** questions from **Section-B**

Section - A (25 Marks)

1. What is converse statement? Give its truth table. (3)
2. Define Tautology, Contingency. (2)
3. What are Quantifiers? List them. (3)
4. Define Pigeonhole principle. (2)
5. What is Recurrence Relation? (2)
6. Define POSET. (3)
7. What is the In degree and Out degree of a graph? (2)
8. Define Isomorphism. (2)
9. Define the chromatic number of a graph with an example (3)
10. Define Bipartite graph with example. (3)

Section - B (50 Marks)

11. (a) Obtain the principle disjunctive normal form of $(x + y)\bar{z}$ (5)
 (b) Express the following statement as a disjunction (in DNF) (5)
 Also using quantifiers:
There exists a woman who has taken a flight on every airline in the world
12. (a) Use mathematical induction to prove the inequality $n < 2^n$ for all positive integers. (4)
 (b) Solve the recurrence relation (6)
 $A_n - 5A_{n-1} + 8A_{n-2} - 4A_{n-3} = 0$ for $n \geq 3$, $a_0=1$, $a_1=0$, $a_2=1$.
13. (a) Solve the recurrence relation using generating functions (5)
 $a_k = 3a_{k-1}$ for $k = 1, 2, 3 \dots$ and initial condition $a_0 = 2$.
 (b) Find the number of solutions of $e_1 + e_2 + e_3 = 17$, where e_1, e_2 and e_3 are non-negative integers with $2 \leq e_1 \leq 5$, $3 \leq e_2 \leq 6$ and $4 \leq e_3 \leq 7$. (5)
14. (a) In the set $S = \{1, 2, 3, \dots, 100\}$, how many elements are not divisible by 3? (3)
 (b) Write the Modular Exponentiation algorithm and calculate value of $7^{644} \bmod 645$. (7)
15. (a) Briefly explain Prim's algorithm with an example. (4)
 (b) Use the Quire-McCluskey method to simplify the following SOP expansion. (6)
 $xyz + x\bar{y}z + \bar{x}yz + \bar{x}\bar{y}z + \bar{x}\bar{y}\bar{z}$
16. (a) Write down the truth table for 3-input EX-OR gate. (5)
 (b) State the rules for K-map simplification. (5)
17. What do you mean by a minimal spanning tree? Explain DFS method for finding a spanning tree with an example. (10)

