**Code No. 3300**

## FACULTY OF INFORMATICS

**B.E. 2/4 (IT) First Semester (Supplementary) Examination, June/July 2011**

## DISCRETE MATHEMATICS

Time : Three Hours] [Maximum Marks : 75

**Note :**— Answer **ALL** questions from Part A. Answer any **FIVE** questions from Part B.

### PART—A (Marks : 25)

1. Construct a Truth Table for $(p \vee q) \rightarrow (p \wedge q)$. 2
2. Express the statement using quantified form : "Every one who is healthy can do all kinds of work". 2
3. Define Generalized pigeon hole principle. 2
4. Prove that $\sqrt{2}$ is an irrational number. 2
5. Define partially ordered set. 2
6. Let U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} be the universal set and A = {1, 3, 5, 7, 9}, B = {2, 4, 6, 8, 10}. Show how A and B can be represented on a computer ? 3
7. Find the solution of the recurrence relation :

   $a_n = a_{n-1} + 2a_{n-2}$ with $a_0 = 2$, $a_1 = 7$. 3
8. Define Adjacency matrix and Incedency matrix. 3
9. Find the number of Derangements of a set with 4 elements. 3
10. Use Karnaugh map to minimize $x\bar{y} + \bar{x}y + \bar{x}\,\bar{y}$. 3

### PART—B (Marks : 50)

11. (a) Show that the propositions $p \vee (q \wedge r)$ and $(p \vee q) \wedge (p \vee r)$ are logically equivalent. 5

    (b) Show that $[\neg P \wedge (p \vee q)] \rightarrow q$ is a tautology. 5
12. (a) Find the Big-O Estimate for n !. 5

(b) Use mathematical Induction to prove that $n^3 - n$ is divisible by 3 whenever n is a positive integer. 5

13. (a) Find the solution of the recurrence relation $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$ with the initial conditions $a_0 = 2, a_1 = 5$ and $a_2 = 15$. 5

(b) Find the solution of the recurrence relation :

$a_n = 3a_{n-1} + 2n$ with initial condition $a_1 = 3$. 5

14. (a) Find the number of Integers from 1 to 1000 inclusive are divisible by either 5, 6 (or) 8. 5

(b) Find the number of non negative integer solutions :

$x_1 + x_2 + x_3 = 11$, where $x_1 \le 3$, $x_2 \le 4$ and $x_3 \le 6$. 5

15. (a) Show that the relation $R = \{(a, b) / a \equiv b \pmod{m}\}$ is an equivalence relation on the set of integers. 5

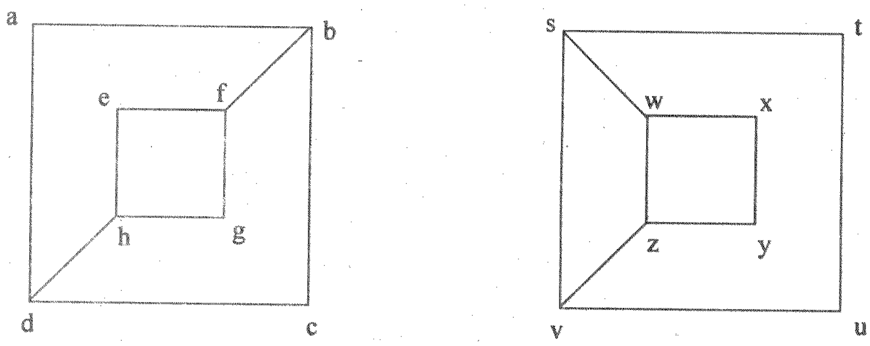
(b) Show that "greater than or equal" relation ($\ge$) is partial ordering on the set of integers. 5

16. (a) Define tree, spanning tree and minimum spanning tree. 5

(b) Find the sum of products expansion for the function

$F(x, y, z) = (x + y)\overline{z}$. 5

17. (a) Determine whether the two graphs are Isomorphic (or) not : 5




(b) Explain about Euler circuits and Hamilton paths. 5