Code No. : 5341/N

FACULTY OF ENGINEERING
B.E. 2/4 (CSE) I Semester (New) (Main) Examination, Dec. 2011
DISCRETE STRUCTURES

Time: 3 Hours] [Max. Marks: 75

***Note** : Answer **all** questions from Part **A**. Answer **any five** questions from Part **B**.*

PART – A **(25 Marks)**

1. Write the Logical equivalent to the following statement : **2**

   $\sim(p \wedge q) \rightarrow (\sim p \vee (\sim p \vee q))$

2. Define the rule of universal specialization ? Give one example. **2**

3. Among 'n' pigeon holes, some pigeon holes should contain atleast 3 pigeons. Find the number of pigeons. **2**

4. How many reflexive relations are there on a set with 8 elements. **2**

5. Write a relation R, which should be a Bijective function on the given set A = {1, 2, 3, 4}. **2**

6. What is an order of a group ? Explain with example. **3**

7. What is the dearrangement for 1, 2, 3, 4, 5. **3**

8. Write the solution for the recurrence relation **3**

   $a_n - 6a_{n-1} + 9a_{n-2} = 3^n$

9. Define wheel graph ? When a wheel graph with n-vertices becomes regular ? Give one example to support your answer. **3**

10. What is graph traversible ? If V(G) = {A, B, C, D}; Determine the traversible Edgeset E(G) **3**

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PART – B (50 Marks)

11. a) Show that $[(p \vee q) \rightarrow r] \leftrightarrow [\neg r \rightarrow \neg(p \vee q)]$ is tautology ? 5

b) Prove : $p \rightarrow (q \rightarrow r)$

$\neg p \rightarrow \neg p$

p

$\therefore r$

using rules of Inferences. 5

12. a) Prove that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$. 4

b) Let $f : R \rightarrow R$, be defined by $f(x) = \begin{cases} 3x - 5; x > 0 \\ -3x + 1; x \leq 0 \end{cases}$, then

determine :

1) $f(-1)$, $f(5/3)$, and $f(-5/3)$

2) $f^{-1}(0)$, $f^{-1}(-6)$, $f^{-1}(1)$. 6

13. a) List and explain the properties of Binary relations with example. 4

b) Let $A = \{1, 2, 3, 4, 5\} \times \{1, 2, 3, 4, 5\}$ and R is defined on A by (x_1, y_1) R (x_2, y_2) if $x_1 + y_1 = x_2 + y_2$; verify that R is an equivalence relation on A. 6

14. Prove that $F_n = F_{n-1} + F_{n-2}$ is the Fibonacci relation for $n \geq 2$, then there are constants c_1 and c_2 such that

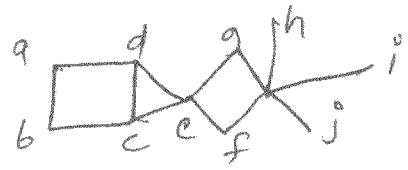
$$F_n = c_1 \left(\frac{1+\sqrt{5}}{2} \right)^n + c_2 \left(\frac{1-\sqrt{5}}{2} \right)^n$$ 10

15. a) Find the coefficient of x^{15} in $(1+x)^4/(1-x)^4$. 6

b) Write short note on group code and its applications. 4

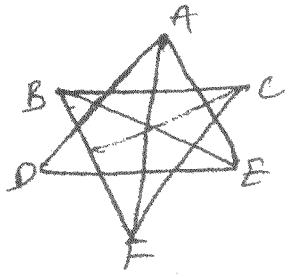
16. a) For the Algebraic system $\langle zm, * \rangle$, let $m = 3$; $m_1 = 2$; $m_2 = 3$; $m_3 = 5$. Find the number whose residue representation is $\langle 1,1,4 \rangle$ 5

b) Draw and explain the BFS and DFS algorithms for the following graph : 5



17. a) What is isomorphic graph ? Explain various conditions for proving the given graphs is not isomorphic. 4

b) Check the following graphs are isomorphic or not. 6



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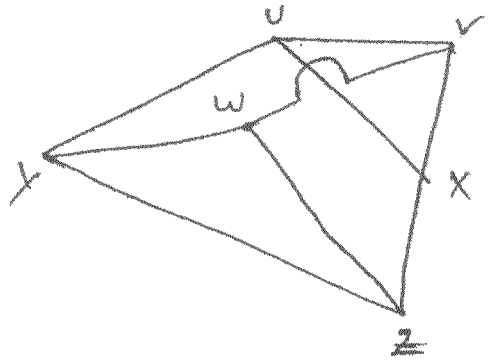

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