

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

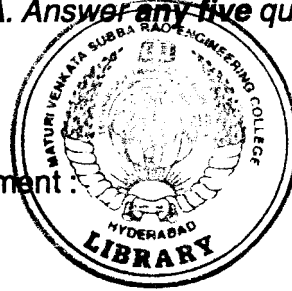
Time: 3 Hours]

[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 Bijjective 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

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

$$\neg p \rightarrow \neg p$$

$$\frac{p}{\therefore r}$$

using rules of Inferences. 5

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

b) Let $f: \mathbb{R} \rightarrow \mathbb{R}$, 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

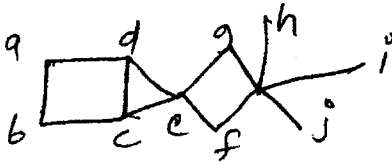
14. Prove that $F_n = F_{n-1} + F_{n-2}$ is the Fibonacci relation for $n \geq 2$, then there are constants c_1 and c_2 such that

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

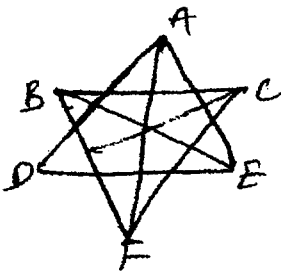
15. a) Find the coefficient of x^{15} in $(1+x)^4 / (1-x)^4$. 6

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

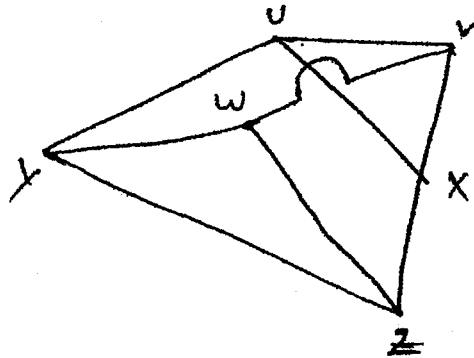
16. a) For the Algebraic system $\langle \mathbb{Z}_m, * \rangle$, let $m = 3$; $m_1 = 2$; $m_2 = 3$; $m_3 = 5$. Find the number whose residue representation is $\langle 1, 1, 4 \rangle$ 5
- b) Draw and explain the BFS and DFS algorithms for the following graph : 5



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



(G)



(G')