

[4]

- b) Write short notes:
- i) Eulerian Graph
 - ii) Isomorphism
 - iii) Application of graphs in compose.

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Total No. of Questions :8]

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Roll No

MCTA - 101

M.E./M.Tech., I Semester

Examination, June 2014

Mathematical Foundation of Computer Application

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.

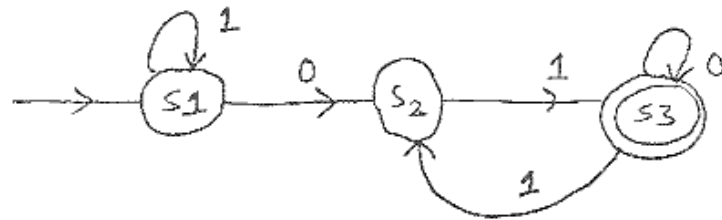
ii) All questions carry equal marks.

1. a) Show that if R_1 and R_2 are equivalence relations on A , then $R_1 \cap R_2$ is an equivalence relation. 7
- b) Let $A = \{4, 6, 8, 10\}$ and $R = \{(4, 4), (4, 10), (6, 6), (6, 8), (8, 10)\}$ is a relation on set A . Determine transitive closure of R . 7
2. a) Prove that if $f: x \rightarrow y$ and $g: y \rightarrow z$ be two one to one onto function, then $g \circ f$ is also one-to-one onto function. 7
- b) Prove that in a distributed lattice (L, \wedge, \vee) , $(a \wedge b) \vee (b \wedge c) \vee (c \wedge a) = (a \vee b) \wedge (b \vee c) \wedge (c \vee a)$ holds for all $a, b, c \in L$. 7
3. a) Write each of the following in disjunctive normal form
- i) $(x+y)(x'+y')$
- ii) $x'z + xz'$
- iii) x 7

- b) Determine the validity of the following arguments without using truth tables.

Either I will pass the examination, or, I will not graduate.
If I do not graduate, I will go to Canada. I failed: Thus,
I will go to Canada. 7

4. a) Describe the language $L = L(M)$ accepted by DFA whose transition graph is shown in figure. 7



- b) Design a DFA to accept the language $L = \{u | u \text{ has both even number of 0's and even number of 1's}\}$. Check whether this DFA accepts 110101. 7

5. a) Find the particular solution of the difference equation $a_r - 2a_{r-1} = 7r^2$. 7

- b) Solve the difference equation

$$a_r + 6a_{r-1} + 9a_{r-2} = 3$$

with initial conditions $a_0 = 0$ and $a_1 = 1$. 7

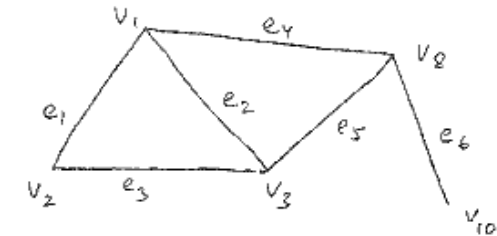
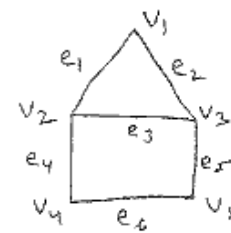
6. a) Solve the recurrence relation $a_{r+2} - 5a_{r+1} + 6a_r = 2$
by the method of generating functions satisfying the
initial conditions $a_0 = 1$ and $a_1 = 2$. 7

- b) If P, Q and R are three atomic variables, obtain principal disjunctive normal form for

$$(P \rightarrow (Q \wedge R)) \vee (\vee P \rightarrow (Q \vee R))$$

7

7. a) If G_1 and G_2 are two graphs given below: 7



Find $G_1 \cup G_2$, $G_1 \cap G_2$, $G_1 \oplus G_2$.

- b) Obtain the incidence and the adjacency matrix of the directed graph given below. Also, from the adjacency Matrix, show that the graph is strongly connected or not? 7

8. a) What is minimum spanning tree of a graph? Execute Prim's algorithm to find minimum spanning of the following graph. 7

