

Oct-22/TE/Insem-557

T.E. (Information Technology)

THEORY OF COMPUTATION

(2019 Pattern) (Semester - I) (314441)

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates :

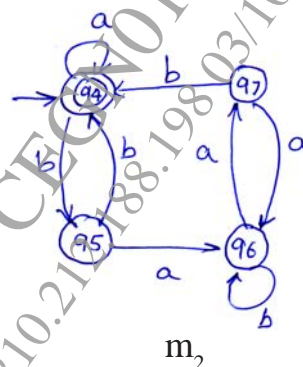
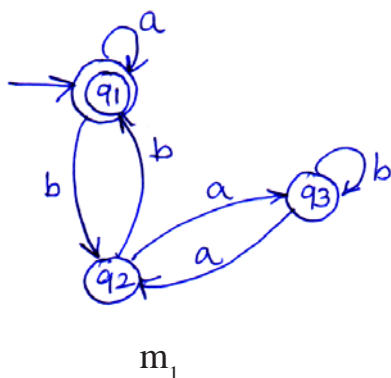
- 1) Answer Q.1 or Q.2, Q.3 or Q.4.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data, if necessary.

- Q1)** a) Design a DFA which accepts a binary number divisible by 4. [5]
 b) Design a Mealy machine to increment binary number by 1. Write down transition table. [4]
 c) Convert the following NFA with ϵ -moves to DFA. [6]

State/input	δ			
	ϵ	a	b	c
$\rightarrow p$	{q}	{p}	ϕ	ϕ
q	{r}	ϕ	{q}	ϕ
r^x	ϕ	ϕ	ϕ	{r}

OR

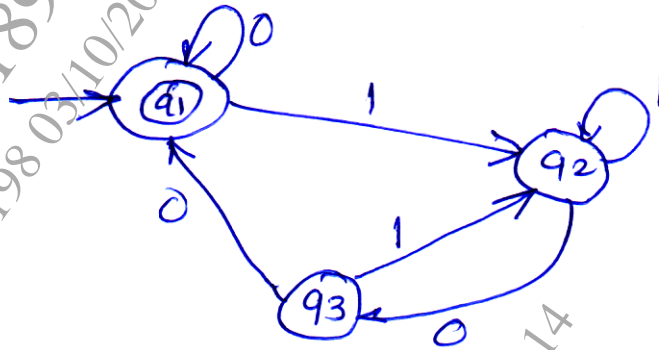
- Q2)** a) Define the following terms with proper examples. [6]
 i) Alphabets
 ii) String
 iii) Natural language
 b) Show whether the following automata m_1 & m_2 are equivalent or not. [5]



P.T.O.

- c) Construct a DFA over the alphabet $\{a, b\}$ for accepting the strings ending with "ab". [4]

- Q3) a) Find the regular expression for the set of strings recognized by the given FA using Arden's theorem. [5]



- b) Determine the regular expression over the alphabet $\{0, 1\}$ for the following : [6]
- All the string containing exactly two 0's
 - All the string that do not end with 01
 - All the string containing 1 as a third character from end.
- c) Explain the following terms . [4]
- Kleene closure
 - Positive closure

OR

- Q4) a) Explain any three closure properties of Regular language. [6]
- b) What is a Regular expression? Explain in brief the applications of regular expressions. [5]
- c) Construct a NFA for the following RE using direct method [4]
- RE = $(ab + ba)^*aa$

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