Total No. of Questions : 4] SEAT No. :

[Total No. of Pages : 2

P8577

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]**

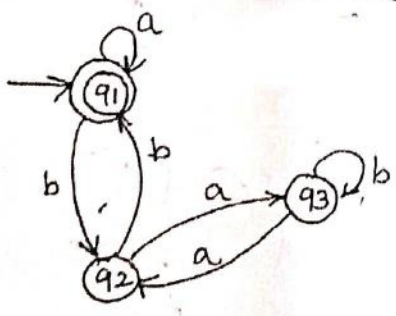
State/input	δ			
	ε	a	b	c
→ p	{q}	{p}	ϕ	ϕ
q	{r}	ϕ	{q}	ϕ
r*	ϕ	ϕ	ϕ	{r}

OR

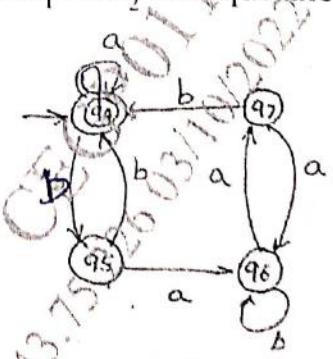
Q2) a) Define the following terms with proper examples. **[6]**

i) Alphabets
ii) String
iii) Natural language

b) Show whether the following automata m_1 & m_2 are equivalent or not. **[5]**



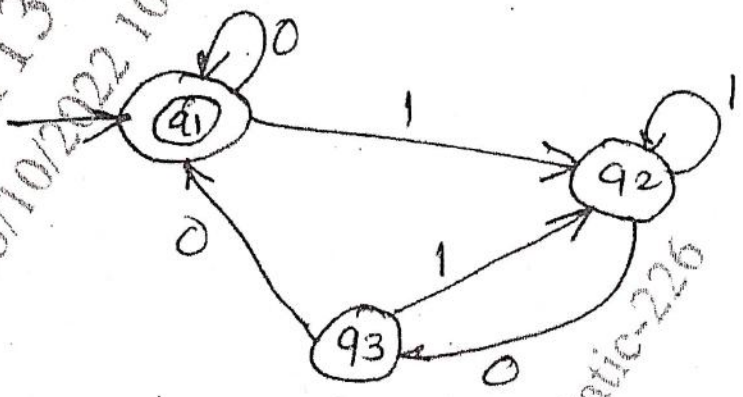
m_1



m_2

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]

i) All the string containing exactly two 0's

ii) All the string that do not end with 01

iii) All the string containing 1 as a third character from end.

c) Explain the following terms:

i) Kleene closure

ii) 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