Total No. of Questions : 4]

SEAT No. : ____

P8556

[Total No. of Pages : 2

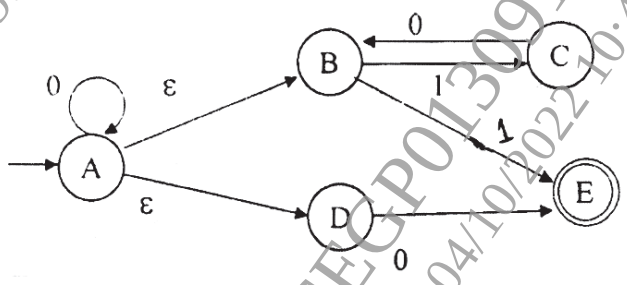
[Oct 22/TE/Insem]-526
T.E. (Computer Engineering)
THEORY OF COMPUTATION
(2019 Pattern) (Semester -I) (310242)

Time : 1 Hour] ***[Max. Marks : 30***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Convert the given NFA–ε to an NFA to DFA. **[10]**

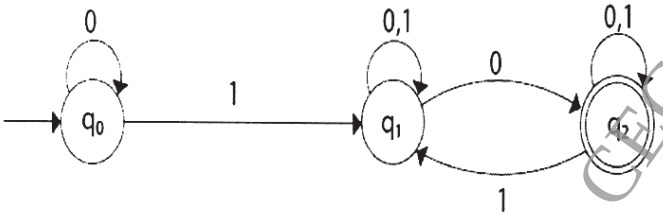


b) Define Pumping Lemma and apply it to prove the following

$L=\{0^m1^n0^{m+n} \mid m>=1 \text{ and } n>=1\}$ is not regular **[5]**

OR

Q2) a) Convert following NFA to DFA **[6]**



b) Design a Mealy machine that accepts strings ending in '00' or '11'. Convert the Mealy machine to the equivalent Moore machine **[9]**

P.T.O.

Q3) a) Convert the following RE to ε–NFA and find the ε–closure of all the states and corresponding DFA. (0+1)*. 1.(0+1) **[9]**

b)
- The set of strings over {0,1} that have at least one 1. **[6]**
- The set of strings over {0,1} that have at most one 1.
- The set of all strings over {0,1} ending with 00 and beginning with 1.

OR

Q4) a) Consider the two RE r=0*+1*, s=01*+10*+1*0+(0*1)* **[8]**

i) Find the string corresponding to r but not to s.

ii) Find the string corresponding to s but not to r.

iii) Find the string corresponding to both r & s.

iv) Find the string corresponding to neither r nor s.

b) Write regular expressions for the following languages over the alphabet ∑={a,b} **[7]**

i) All strings that do not end with ‘aa’.

ii) The set of all strings ending neither in b nor in ba

iii) Find the shortest string that is not in the language represented by the regular expression a*(ab)*b*.

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SEAT No. :

P-5341

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[6187]-426A

T.E. (Computer Engineering) (Insem.)

THEORY OF COMPUTATION (Theory)

(2019 Pattern) (Semester - I) (310242)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates :

1) ***Answer the question of 1 or 2, 3 or 4.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Draw FA for the following language over {0, 1} **[8]**

i) Number of 1's is multiple of 3.

ii) Number of 1's is not multiple of 3

b) Covert following NFA into equivalent DFA and perform DFA minimization **[7]**

Q/Σ	0	1
→ P	{P, Q}	{P}
Q	{R}	{R}
R	{S}	--
S*	{S}	{S}

OR

Q2) a) Construct DFA for checking "whether a string over alphabet {*a, b*} contains a substring *aba*". **[5]**

b) i) Differentiate between Moore machine and Mealy machine.

ii) Construct Moore machine equivalent to the following Mealy machine. (Show it in transition Diagram)

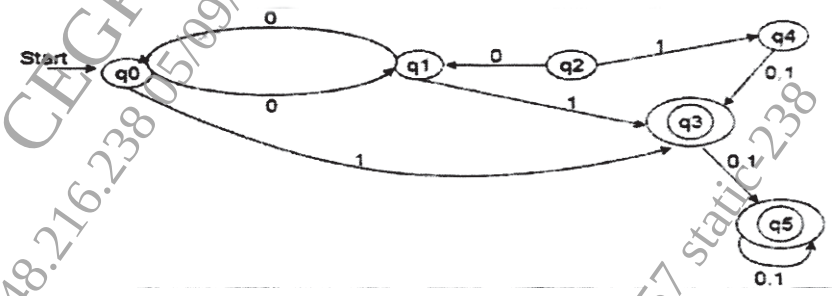
M = (Q, Σ, Δ, δ, q0) where Q = {q0, p0, p1}, Σ = {0, 1), Δ = {*y. n*} and δ is shown as given below.

P.T.O.

States	Input / Output	
	0	1
q0	p0/n	p1/n
P0	p0/y	p1/n
P1	p0/n	p1/y

[5]

c) Convert the following DFA to its Minimized form (Minimization of DFA). **[5]**



Q3) a) Prove that LHS RE is equivalent to RHS RE
(1+00*1)+(1+00*1)(0+10*1)*(0+10*1)=0*1(0+10*1)* **[5]**

b) Find a regular expression corresponding to each of the following subsets of {0,1}* **[6]**

i) The language of all strings containing exactly two zeros

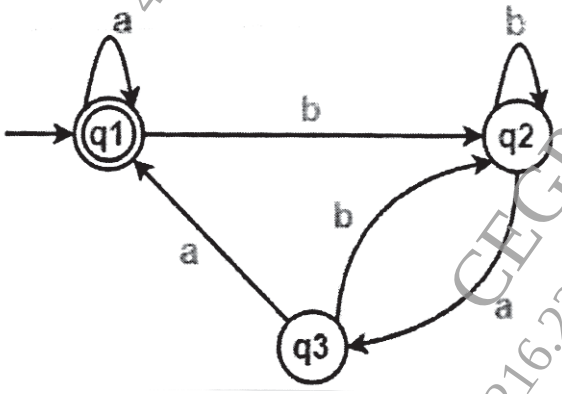
ii) The language of all strings containing at least two zeros

iii) The language of all strings that do not end with 01.

c) Write a note on Myhill Nerode theorem. **[4]**

OR

Q4) a) Construct Regular expression for following DFA using Ardens theorem. **[7]**



b) i) Write regular expression for a set of strings of 0s and 1s with even number of 0s.

ii) Write regular expression for a set of strings of 0s and 1s containing odd number of 1s.

[4]

c) Choose any one option given below and give the justification "The regular expression 0*(10*)* denotes the same set as" **[4]**

i) (1*0)*1*

ii) 0+(0+10)*

iii) (0+1)* 10(0+1)*

iv) none of these

▽▽▽▽

Total No. of Questions : 4]

SEAT No. : [ ]

PC26

[6360]-26

[Total No. of Pages :2

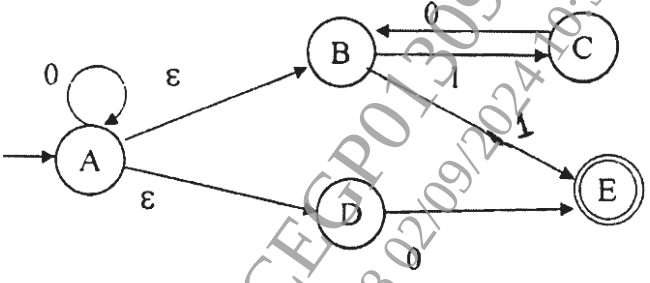
T.E. (Computer Engineering) (Insem)
THEORY OF COMPUTATIONS
(2019 Pattern) (Semester- I) (310242)

Time : 1 Hour] ***[Max. Marks : 30***

Instructions to the candidates:

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

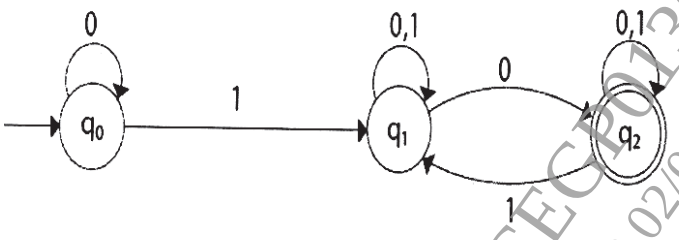
Q1) a) Convert the given NFA-ε to an NFA to DFA. **[9]**



b) Design a DFA which can accept a decimal number divisible by 3. **[6]**

OR

Q2) a) Convert following NFA to DFA. **[7]**



b) i) Design a moore machine for the 1's complement of binary number.

ii) Design a Mealy machine to find out 2's complement of a given binary number. **[8]**

P.T.O.

Q3) a) Convert the following RE to ε-NFA and find the ε-closure of all the states and corresponding DFA. (0 + 1) *.1.(0 + 1). **[9]**

b) i) Regular Expression of strings over {0,1} that have at least one 1.

ii) Regular Expression of strings over {0,1} that have at most one 1.

iii) Regular Expression of all strings over {0,1} ending with 00 and beginning with 1.

[6]

OR

Q4) a) i) Write the regular expression for the language starting with a but not having consecutive b's.

ii) Write the regular expression for the language L over ∑ = {0,1} such that all the string do not contain the substring 01.

iii) Write the regular expression for the language containing the string over {0,1} in which there are atleast two occurrences of 1's between any two occurrences of 1's between any two occurrences of 0's. **[7]**

b) Design a FA from given regular expression 10 + (0 +11) 0 *1. **[4]**

c) Construct the regular expression for the given DFA using Ardens Theorem. **[4]**