[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.

	Input / Output	
States	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]
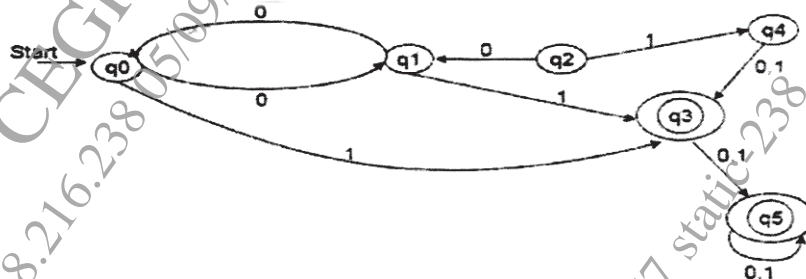
Q3) a) Prove that LHS RE is equivalent to RHS RE

$(1+00*1)+(1+00*1)(0+10*1)*(0+10*1)=0*1(0+10*1)*$ **[5]**

b) Find a regular expression corresponding to each of the following subsets of $\{0,1\}*$ **[6]**
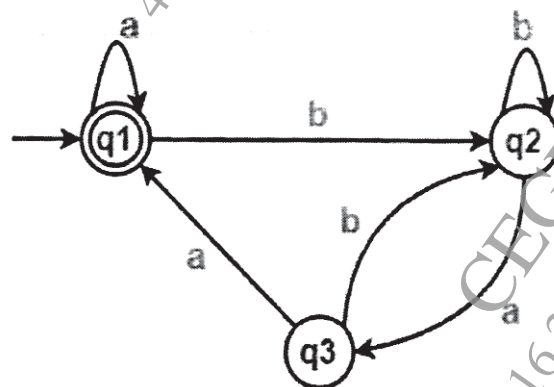
    i)   The language of all strings containing exactly two zeros

    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]**

<div align="center">OR</div>

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

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