Total No. of Questions : 6]

SEAT No. :

P5087

[Total No. of Pages : 3

TE/Insem.-636
T.E. (Computer Engineering) (Semester-I)
THEORY OF COMPUTATION
(2015 Pattern)

Time : 1 Hour] *[Maximum Marks : 30*

Instructions to the candidates:

1) *Attempt questions Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Assume suitable data if necessary.*

Q1) a) Compare DFA and NFA. **[3]**

b) Construct a DFA to accept strings of 0's and 1's having at least three consecutive 0's. **[3]**

c) Construct an equivalent DFA for the following NFA- **[4]**

States/∑	0	1
→p	{p,q}	{q}
ⓠ	{r}	{r}
r	-	{r}

OR

Q2) a) Compare NFA and NFA - ε . **[3]**

b) Construct a Mealy Machine which is equivalent to the Moore Machine given in the following table: **[3]**

Present State	Next state		Output
	a=0	a=1	
→q_0	q_3	q_1	0
q_1	q_1	q_2	1
q_2	q_2	q_3	0
q_3	q_3	q_0	0

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c) Construct the DFA for the language of all strings that begin and end with same symbol over the alphabet $\sum = \{0, 1\}$. **[4]**

Q3) a) Define the following with suitable example **[3]**

i) Regular expression & operations

ii) Prove or disprove the following (rs+r)* r=r (sr+r)*

b) Construct the finite Automata defined over $\sum = \{0, 1\}$ for the following Regular expression 1(01+10)* +0(11+10)* **[3]**

c) Using the pumping lemma for the regular set, prove that $L = \{a^{i \text{ square}} | i \geq 1\}$ is not regular. **[4]**

OR

Q4) a) What are the algebraic laws of regular expression. **[3]**

b) Convert the following regular expression to ε-NFA. and find the ε-closure of all the states. (0+1)*.1.(0+1) **[3]**

c) Using the pumping lemma for the regular set, prove that $L = \{a^m b^n\}$ is not regular. **[4]**

Q5) a) Write in brief about "Sentential form" with reference to context free grammar. **[3]**

b) Write equivalent left linear grammar for the following right liner grammar.

$S \rightarrow 0A$

$A \rightarrow 10A | \in$ **[3]**

c) Write context free grammar for the following language 0(0+1)* 01(0+1)*1 **[4]**

OR

Q6) a) Eliminate $\in$-productions from the grammar G **[3]**

$A \rightarrow aBb|bBa$

$B \rightarrow aB|bB|\in$

b) Write CFL for following CFG **[3]**

$S \rightarrow aB|bA$

$A \rightarrow a|aS|bAA$

$B \rightarrow b|bS|aBB$

c) Write an equivalent left-linear grammar for the right-linear grammar. **[4]**

$S \rightarrow 0A|1B$

$A \rightarrow 0C|1A|0$

$B \rightarrow 1B|1A|1$

$C \rightarrow 0|0A$