Total No. of Questions : 6] SEAT No. :

P5038

[Total No. of Pages : 3

T.E./Insem. - 536
T.E. (Computer)
THEORY OF COMPUTATION
(2012 Pattern) (Semester - I)

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

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume Suitable data if necessary.***

Q1) a) Define Regular Expression. What are its limitations? List applications of RE. **[3]**

b) Define Pumping Lemma Using Pumping Lemma for regular sets prove the following :

$L = \{0^m\ 1^n\ 0^{m+n} | m>=1 \text{ and } n>=1\}$ is not regular **[4]**

c) Draw a FA for strings which do not contains 00 as substring over alphabets {0, 1}. **[3]**

OR

Q2) a) Show by principle of mathematical induction $1^2 + 2^2 + 3^2 + ... + n^2 = n(n + 1)(2n + 1)/6$. **[4]**

b) Define Countable Set. Show that any subset of a countable set is countable. **[3]**

c) Define Deterministic and Non Deterministic Finite Automata in terms of 5-Tuple and discuss various applications of it. **[3]**

P.T.O.

Q3) a) Construct a DFA over the alphabets {0, 1} for accepting the strings **[4]**

i) Ending with 10

ii) Ending with 11

b) State and Explain Arden's theorem. **[2]**

c) Convert the NFA shown in **Table 1** to its equivalent DFA. **[4]**

OR

Q4) a) List the limitations of finite automata. **[2]**

b) Consider the Moore machine described by **Table 2**. Construct the corresponding Mealy Machine. **[4]**

c) Design a NFA to recognize the strings wwyz, wxy, wyz, wxxy over alphabets {w, x, y, z} **[4]**

	0	1
→ p	{p,q)	{p}
q	{r}	{r}
r	{s}	{ϕ}
s*	{s)	{s}

Table 1

Present State	Next state		Output
	A=0	A=1	
Q1	Q1	Q2	0
Q2	Q1	Q3	0
Q3	Q1	Q3	1

Table 2

Q5) a) What is ambiguous grammar? Show that the grammar below is ambiguous, & find the equivalent unambiguous grammar. **[4]**

$E \rightarrow E + E|E*E|(E)|I, I \rightarrow a|b$

b) Define Context free Grammar & give its Applications. **[2]**

c) Simplify the following grammar **[4]**

$S \rightarrow 0A0|1B1|BB, A \rightarrow C, B \rightarrow S|A, C \rightarrow S|\in$

OR

Q6) a) Construct a DFA for the following left linear grammar **[4]**

$S \rightarrow B1 \mid A0 \mid C0,\ B \rightarrow B1 \mid 1, A \rightarrow A1 \mid B1 \mid C0 \mid 0, C \rightarrow A0$

b) Check whether the given grammar is in GNF. If not then find its equivalent GNF. **[4]**

$S \rightarrow AA \mid a, A \rightarrow SS \mid b$

c) Define Concurrent Grammar. **[2]**