Register Number									

ANNA UNIVERSITY

(F.T)

B.E. DEGREE END SEMESTER EXAMINATIONS, APRIL 2019

Computer Science and Engineering

V SEMESTER, Regulation 2012

Time: 3 Hrs CS8504 THEORY OF COMPUTATION Max Marks: 100

PART A (10 x 2 = 20 Marks)

1. Differentiate DFA from NFA with $\in$ transition.
2. Prove that the reversal of any regular language is also regular.
3. Write unambiguous context free grammar for the set of all arithmetic expressions.
4. Define DPDA. How does it differ from PDA?
5. What are the components of a Turing Machine?
6. What is a multi-dimensional Turing Machine?
7. Prove that the complement of any recursive language is also recursive.
8. Differentiate PCP from MPCP.
9. Write a matrix grammar for the language ww, $w \in (a + b + c)^*$.
10. Define regular control grammar.

PART B (5 x 16 = 80 Marks)

11. i. Prove that if L is accepted by an NFA with $\in$ transitions, then L is accepted by DFA.

ii. Consider the $\in$-NFA, whose transition table is given here. Compute the $\in$-Closure of each state and find it's equivalent DFA.

States	Input			
	$\in$	a	b	C
p	{q, r}	Φ	{q}	{r}
q	Φ	{p}	{r}	{p, q}
*r	Φ	Φ	Φ	{r}

12. a. Prove that for every PDA accepting language by using empty stack, there exists a PDA accepting language using final state. Give an example.

(OR)

b. Simplify the following grammar and find its equivalent in CNF.

$S \rightarrow aSd \mid A \mid B \qquad A \rightarrow aAc \mid C \qquad B \rightarrow bBd \mid C \qquad C \rightarrow bCc \mid \in$

13. a. Design a Turing Machine to recognize the language of the form $w\#w^R$, w is a string from { 0 , 1 }* and w^R is the reverse of w.

(OR)

b. Design a TM to find $\log_2 n$, where n is stored initially in the TM tape in unary form.

14. a. Prove that if L is a recursively enumerable language, then L = L(G) for some unrestricted grammar G.

(OR)

b. Prove that if L is L(M) for some linear bounded automaton M, then $L - \{\in\}$ is a context sensitive language.

15. a. Explain the role of Lindenmayer systems in language recognition.

(OR)

b. Explain the role of membrane computing with necessary examples.