Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: IT303

Course Name: THEORY OF COMPUTATION (IT)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks

Marks

1 a) Explain Chomsky classification of grammars. (5)

b) If $\sum=\{a,b,c\}$ then write $\sum^1$, $\sum^2$, $\sum^3$,$\sum^*$. (4)

c) Show how an NFA can be created which accepts the reverse of a language. (6)

2 a) Design an NFA for L={w|w has at least 2 consecutive 0's or 1's over $\sum=\{0,1\}$}. (6)

b) Define the language of DFA, NFA and NFA-ε. (4)

c) Convert the following NFA to DFA. (5)

δ	0	1
→ p	{p,q}	{p}
q	ϕ	{r}
*r	{p,r}	{q}

3 a) Describe the language of the following DFA. (4)

δ	0	1
→ A	B	A
*B	A	B

b) State and prove the equivalence of NFA and DFA. (6)

c) Design a Mealy machine to print 2's complement of a binary number. (5)

PART B

Answer any two full questions, each carries 15 marks

4 a) Give regular expressions for the following: (2)

i) Set of all binary strings beginning with 110.

ii) Set of all binary strings, contains exactly three 1's.

b) Convert the following regular expression to ε-NFA and then to NFA. (10)

i) 011(0+1)*(0+1) ii) (a+b)(ab)*

c) Define Context Free Grammar and Context Free Language. (3)

5 a) Prove that for every regular expression, there exists a deterministic Finite Automata. (8)

b) Show that the language $L=\{0^n1^{2n}|n \geq 1\}$ is not regular. (7)

6 a) List the applications of PDA and CFL. (4)

b) Design a PDA for the language $L=\{a^ib^jc^k|i\neq j \text{ or } j\neq k\}$. (8)

c) Explain ambiguity in CFG with the help of an example. (3)

PART C

Answer any two full questions, each carries 20 marks

7 a) Show that the Universal Language is not recursive. (10)

b) Design a Turing Machine for L={ww | w ϵ{0,1}*}. (10)

8 a) List and explain the variants of Turing Machine, and show that they are equivalent to a single tape Turing Machine. (12)

b) Design a Turing Machine that performs integer addition. (8)

9 a) Define Halting Problem and show that it is undecidable. (5)

b) What is Linear Bounded Automata? (5)

c) Build a Turing Machine that accepts the language L={$a^n b^{2n}$}. (10)

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