

Final Examination (2018-19) / Re-Examination (2017-18)

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

- 1) Question No. 01 is compulsory.
- 2) Out of remaining questions, attempt any 04 questions.
- 3) In all 05 questions to be attempted.
- 4) All questions carry equal marks.
- 5) Answer to each new question to be started on a fresh page.
- 6) Figures in brackets on the right hand side indicate full marks.
- 7) Assume Suitable data if necessary.

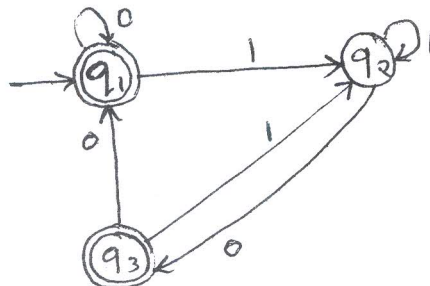
Q.1 a) Design DFA to accept the language $L = \{w \mid w \text{ contains baba as substring}\}$ over $\Sigma = \{a, b\}$ 4M

- b) Give a regular expression for a language over $\Sigma = \{0, 1\}$ 2M
- i) Containing all possible combinations of 0's and 1's but not having two consecutive 0's
 - ii) Write regular expression for set $\{a^n b^m \mid n \geq 3, m \text{ is even}\}$

c) Explain applications and limitations of DFA 4M

d) Explain Chomsky Hierarchy of grammars 4M

Q.2 a) Convert given DFA to regular expression using Arden's Theorem 7M



- b) Design ϵ NFA and convert it to minimized DFA for following regular expression: $(aa^* + aba^*b^*)$ 7M

Q.3 a) Using pumping lemma prove that $L = \{0^i \mid i \text{ is a prime number}\}$ is not a regular language 7M

b) Design PDA which accepts the language denoted by following language 7M
 $L = \{ww^r \mid w^r \text{ is reverse of string } w \text{ and } w \in \{0,1\}^*\}$

Q.4 a) Design a mealy machine that accepts the language consisting of strings from $\Sigma = \{0,1\}$ and ending with 00 or 11. Convert the same to Moore machine 7M

b) Explain closure properties of context free language 7M

Q.5 a) Convert following grammar to CNF 7M
 $S \rightarrow ABA$
 $A \rightarrow aA \mid \epsilon$
 $B \rightarrow bB \mid \epsilon$

b) Design turing machine to calculate 2's complement of a binary number over $\Sigma = \{0,1\}$ 7M

Q.6 a) What is Halting problem? Explain Halting problem is unsolvable 7M

b) Design post machine for language $L = \{a^n b^n \mid n \geq 0\}$ 7M

Q.7 a) What is post correspondence problem? Determine whether the following list has a PCP solution or not. If yes give solution. If no then justify 5M

	A	B
i	w_i	x_i
1	001	01
2	0011	111
3	11	111
4	101	010

b) Explain what is ambiguous grammar and how to eliminate it with example 5M

c) What recursive and recursively enumerable languages. Comment on the language accepted by Turing Machine. 4M