

Minor Exam
Master of Computer Applications
MCAC 303: Automata Theory
Unique Paper Code: 223401303
Year of admission: 2021

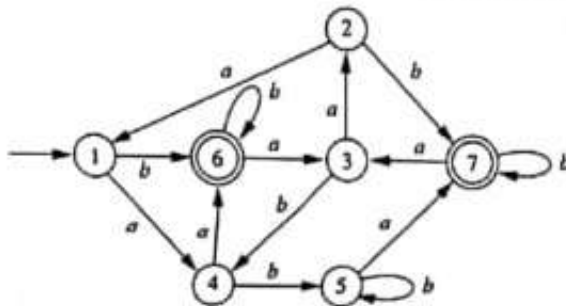
Time: One Hour

Max. Marks: 30

Instructions:

1. All questions carry equal marks.
2. Notations have their usual meaning.
3. Assume $\Sigma = \{a, b\}$ as the underlying alphabet unless mentioned otherwise.

1. Construct a minimum state finite automaton equivalent to the following finite automaton:



2. Construct regular expression and the corresponding finite automaton (FA) for the language:
 $L = \{w \in \Sigma^* \text{ and } |w| > 0: w \text{ ends with } b \text{ and does not contain the substring } aa\}$.
3. Using pumping lemma, show that the language $L: \{a^{n+m}b^m c^n; m, n \geq 1\}$, is not regular over the alphabet $\Sigma = \{a, b, c\}$.
4. Show the step-wise construction of Non-deterministic Finite Automaton (NFA) for the regular expression $ba + (a + bb)a^*b$. Also, convert the above NFA to corresponding Deterministic Finite Automaton (DFA).
5. For languages L_1 and L_2 described by the corresponding regular expressions $(ab^*)^*$ and $b(a + b)^*$, construct the following a) DFA for L_1 and L_2 and b) DFA that defines $L_1 \cap L_2$.
6. Design a deterministic pushdown automaton (DPDA) for the language $L: \{b^n c a^n\}$. Show the trace of the constructed DPDA on a string $bbbcaaaa$.