Roll No	2	0	C	S	E	1	0	30

NATIONAL INSTITUTE OF TECHNOLOGY GOA

Department of Computer Science and Engineering

B.Tech V Semester-Test

Course Name: **Theory of Computation**
Date: **September 21, 2022**
Duration: **60 minutes**

Course Code: **CS303**
Time: **10 AM**
Max. Marks: **30**

Note:

- Be legible. Keep the rough work separate from the space you write the answer.
- The notations used should be consistent as mentioned in the class.
- Attach rough work at the end of the answer script.

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1. Construct a non-deterministic finite automaton accepting $\{ab, ba\}$, and use it to find a deterministic automaton accepting the same language. Note that $\Sigma = \{a, b\}$. **(5)**

2. Design a DFA accepting all strings w over $\{0, 1\}$ such that the number of $1's$ in the string w is 3 mod 4.**(5)**

3. Design a DFA to recognize the following languages.

   a) Given $\Sigma = \{0, 1\}$, design the DFA that recognizes the empty language.**(3)**

   b) $L = \{w | w$ does not contain more than one $0\}$. **(3)**

4. Let $\Sigma = \{0, 1\}$. Consider the following language.

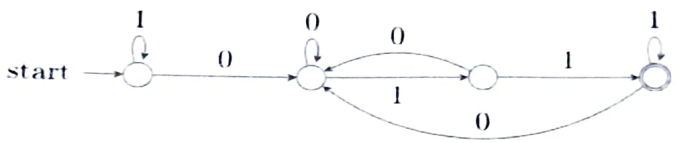
   $L = \{w | w$ begins and ends with the same symbol with total length at least $2\}$.

   a) Construct the DFA to recognize L.**(6)**

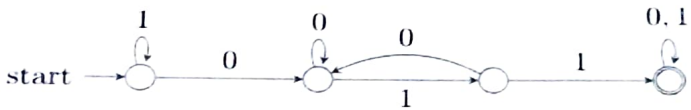
   b) Construct NFA that makes the most use of non-determinism to recognize L. **(6)**

5. Consider the language $L = \{w \in \{0,1\}^* | w$ ends with the substring $011\}$. Which one of the following deterministic finite automata accepts L? You have to provide justification for not choosing any options as correct answer. **(2)**

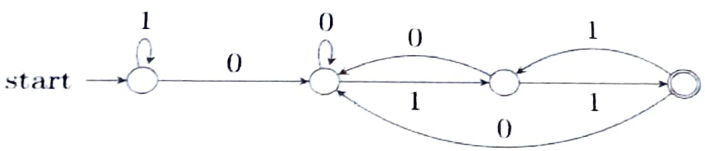
A :



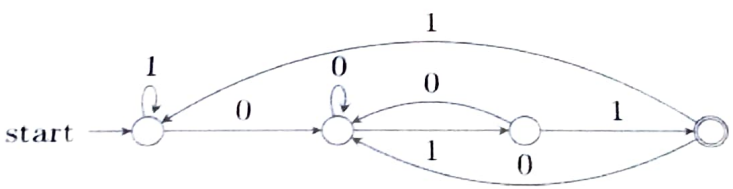
B :



C :



D :



**********All the Best**********