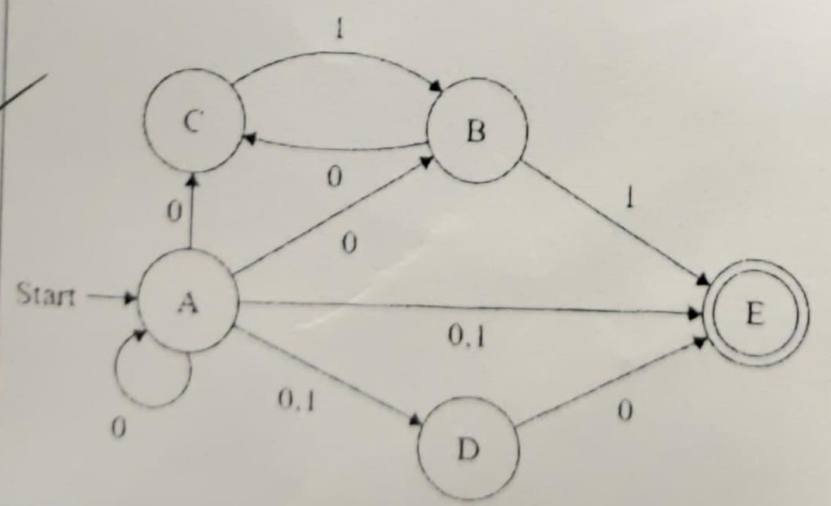
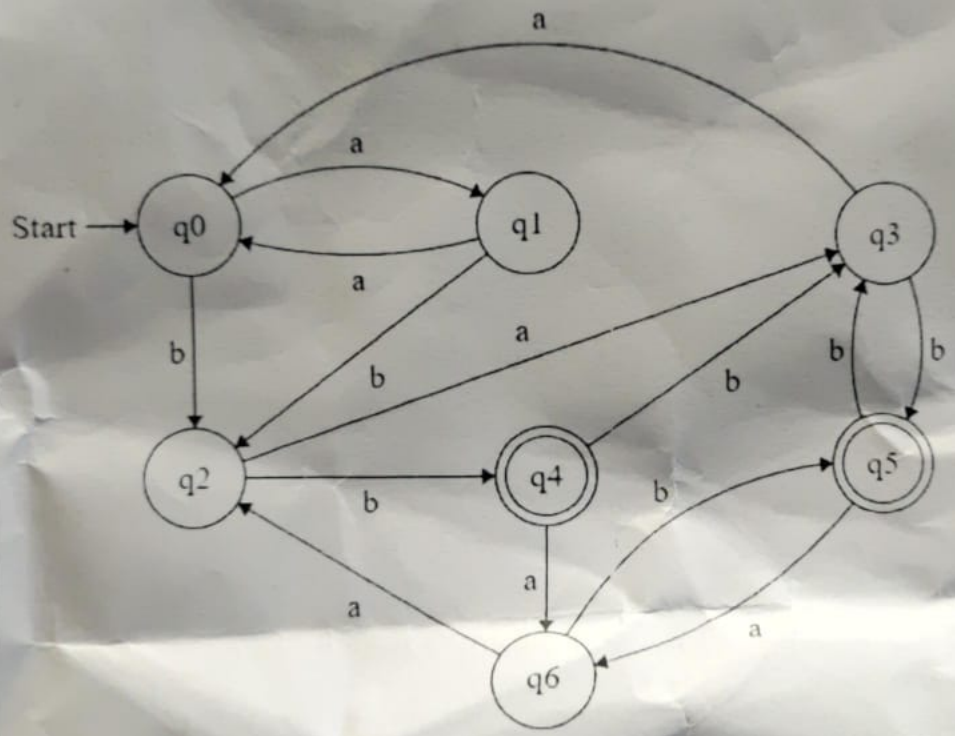
Continuous Assessment Test I – September 2023

Programme	: **B.Tech CSE**	**Semester**	:	FALL 2023-24
Course	: Theory of Computation	**Code**	:	BCSE304L
		Slot	:	F2+TF2
Faculty	: Dr. S. Suseela Dr. Amutha S Dr. Karmel A	**Class Nbr**	:	CH202324010 CH202324010 CH202324010
Time	: 90 Minutes	**Max. Marks**	:	50

Answer ALL the questions

Q. No.	Questions
1.	A lock for a bank contains numbers 0 through 9 in its door. It opens with the current combination that follows: a. Six keys to be pressed in sequence. b. Every odd numbered press should be a prime number (excluding 1), second press should be multiple of three, fourth press should not be a multiple of 4 and 8, the sixth press could be any number that do not fall under any of the previous constraint. Design a deterministic finite automaton for deciding whether to open or not to open the lock and construct the regular expression.
2.	a) Let $\sum=\{a,b\}$. A word w in $\sum^*$ is said to contain a triple letter if w contains aaa or bbb as a substring. Construct the regular grammar that generates all the strings in the language, $L=\{w \in \sum^* \mid$ w contains exactly one triple letter$\}$ [**Hint:** "baaaba" has exactly one triple string. "baaaaba" has two triple strings.] b) Construct an equivalent finite automaton for the expression given below. **[5 marks]** i. $(aa^*b)^* + ba^*$ ii. $(1 \mid (01^*0)^* 1)^*$
3.	Construct an equivalent deterministic finite automaton D for the non-deterministic automaton given below. 

4.	Design a finite automaton that accepts the language, $L=\{L_1 \cup L_2\}$ Where, $L_1 = \{a^{2n+3} \mid n>0\}$ $L_2 = \{a^{3n+2} \mid n>0\}$	10
5.	Construct a minimized Deterministic Finite Automata for the automaton given below.  	10

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