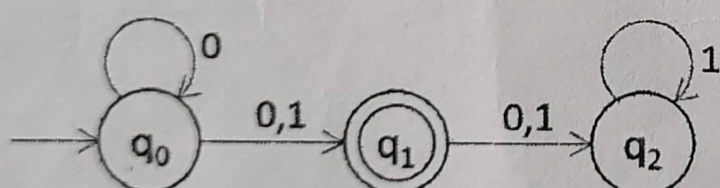**Internal Assessment Question Paper – 1**
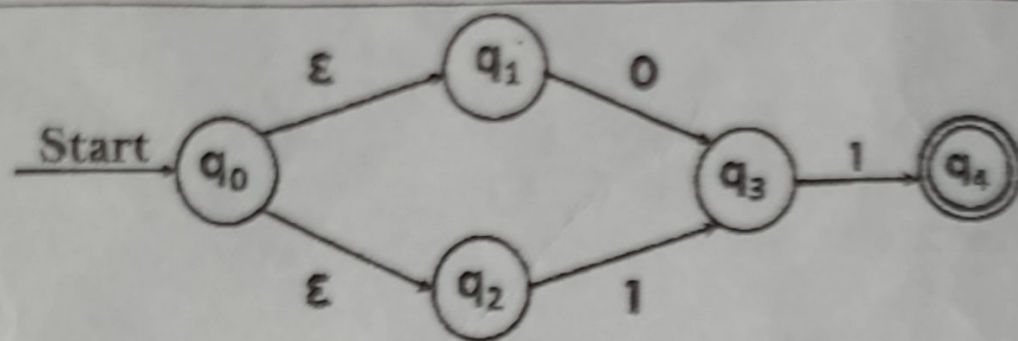
M.S. Ramaiah Institute of Technology
(Autonomous Institute, Affiliated to VTU)
Department of CSE

Programme: B.E   Term: April – July 2024
Course: Finite Automata and Formal languages   Course Code: CS45
Sem: IV   CIE: I   Section: A,B,C

Max Marks: 30   Time: 1Hr   Portions for Test: L1-L4.

Instructions to Candidates: Mobiles, smart watches or any electronic gadgets are strictly banned.
Answer any 2 full question

Sl #		Question	Marks	Bloom's Level	CO Mapping

1	a)	Define DFA. Obtain DFA for the following:
		  i. Design a DFA which accepts all strings with a substring 01.
		  ii. Design an automata with $\Sigma = \{a, b\}$ such that it accepts all strings except those which end with abb.
			6	Apply	CO2

	b)	Convert the following NFA to DFA using subset construction method 	5	Apply	CO3
	c)	Prove that language L is accepted by some ε-NFA if and only if L is accepted by some DFA.	4	Understand	CO1
2	a)	If $D=(Q_D, \Sigma, \phi_D, \{q_0\}, F_D)$ is the DFA constructed from NFA $N=(Q_N, \Sigma, \phi_N, \{q_0\}, F_N)$ by the subset construction. Then show that $L_D = L_N$.	6	Understand	CO1
	b)	Minimize the following DFA |	0	1 | |---|---|---| | →A | B | C | | B | B | D | | C | B | C | | D | B | E | | *E | b | C |	6	Apply	CO2
	c)	Convert the following ε-NFA to DFA	3	Apply	CO3

3	a)	Define Regular expression. Obtain RE for the following: (i) $L=\{ w\mid w \in abab^n$ or aba^n where $n>=0\}$ (ii) To recognize the following keywords abc, abd, aacd	4	Apply	CO1
	b)	Construct NFA for the following (i) $L = \{a^{2n}b^{2m} \mid n \geq 0, m \geq 0\}$ (ii) Strings that end with 00 or 11	6	Apply	CO2
	c)	Obtain a Regular Expression using state elimination method result = a	5	Apply	CO3
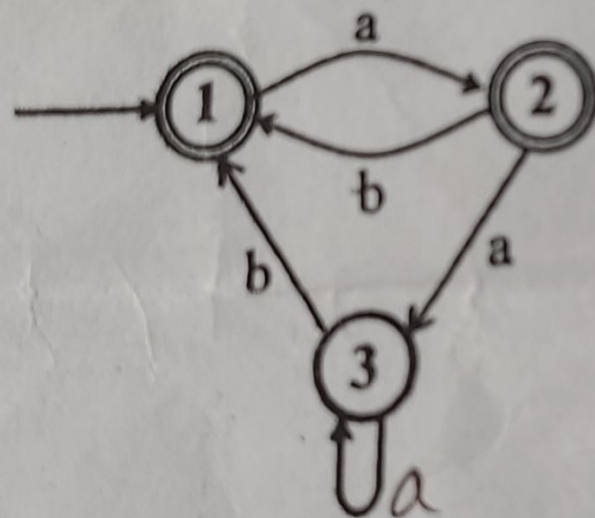
Course Outcomes meant to be assessed by the IA Test-I:
- CO1: Explain the basic concepts of formal languages and automata.
- CO2: Construct automata to accept strings from a specified language.
- CO3: Convert among equivalently powerful notations for a language, including among DFAs, NFAs, and regular expressions, between PDAs, CFGs and normal forms of CFGs