VIT

Vellore Institute of Technology

Continuous Assessment Test - I January 2023

Programme	B.Tech (CSE) and its Specialization	Semester	Winter Semester 2022-23
Course Code	BCSE304L	Class Nbr(s)	CH20212235001244
Course Title			CH20222235001292
	Theory of Computation		CH20222235001415
			CH20222235001456
			CH20222235001243
		Slot	B1+TB1
Faculty(s)	Dr. Amutha S		
	Dr. Jani Anbarasi L		
	Dr. Benil T		
	Dr. Kiruthika S		
	Dr. Karmel A		
		Max. Marks	50
Time	90 Minutes		

Answer all the Questions

Q.No	Sub-division	Question Text	Marks
1.		Strings are defined over an input alphabet $\Sigma = \{a, b, c\}$ as follows: $$A_{(n,m,k)} = a^{n \bmod 4} b^{2m} c^{k \bmod 3}, \forall n \geq 1, k \geq 1, m \geq 0$$ where mod is a function such that x mod y gives the remainder when x is divided by y. For example, 5 mod 3 is 2. Let L be the language generated by the strings $A_{(n,m,k)}$. Design a Finite Automaton M to recognize the language L.	10
2.	a.	Construct an equivalent deterministic finite automaton M_2 for the non-deterministic automaton $M_1 = (\{A, B, C, D\}, \{0,1\}, \delta, \{A\}, \{D\})$ given in Table.1.	7
	b.	Check whether the word "0011" is recognized by the deterministic finite automaton M_2.	3

States	Input	
	0	1
→A	[A,B]	[A,C]
B	[A,D]	[B]
C	[C]	[A,D]
*D	[D]	[D]

Table. 1

...uct a minimized deterministic finite automaton for the automaton {{1,2,3,4,5}, {a,b}, δ, {1}, {1,5}} given in Table.2.

States	Input	
	a	b
→·* 1	3	2
2	4	1
3	5	4
4	4	4
*5	3	2

Table. 2

4. Construct the finite automaton for the language L defined over $\Sigma = \{0,1\}$ where,

$L = L_1 \cup L_2$

$L_1 = \{ w \mid w \varepsilon \{0,1\}^*$ contains strings that are multiples of 4$\}$

$L_2 = \{ w \mid w \varepsilon \{0,1\}^*$ contains the strings that starts with 1 and end with 10$\}$

5. List out the strings generated by the regular expressions,

i. $b^* ab(a+b)^* a^* b$

ii. $(0 \mid 1 (01^* 0)^* 1)^*$

Design an epsilon NFA for the above regular expressions using McNaughton Yamada Thompson Algorithm.

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