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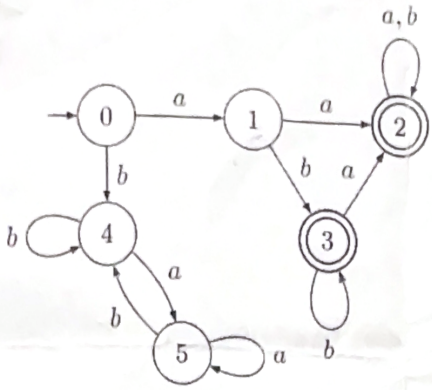
VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

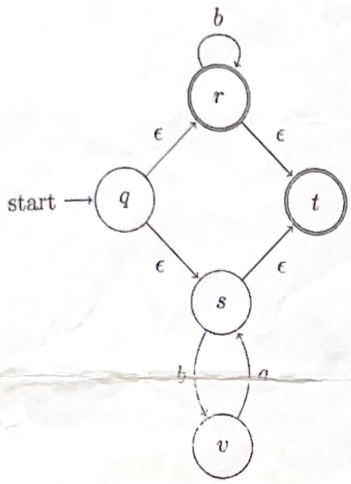
Continuous Assessment Test- 1(CAT-1)– September 2022

Programme	:	**B.Tech. [CSE and Specialization]**	Semester	:	**FS 22-23**
Course Code	:	**BCSE304L**	Slot	:	**B2+TB2**
Course Title	:	**Theory of Computation**			
Faculty(s)	:	**Dr. Prakash P, Dr. Smrithy G S, Dr. Sivakumar, Dr. Ashoka Rajan R, Dr. B V A N S S Prabhakar Rao, Dr. Sureshkumar, Dr. Maria Anu**	Class Nbr(s)	:	**CH2022231001522, CH2022231001523, CH2022231001524, CH2022231001525, CH2022231001528, CH2022231001530, CH2022231001532**
Time	:	**90 Minutes**	Max. Marks	:	**50**

Answer ALL the Questions

Q.No.	Sub. Sec.	Questions	Marks
1.		Consider the following two languages: L_1 = {aa, bb} where Σ = {a, b} L_2 = {ppp, qqq} where Σ = {p, q}. Compute the following: a) $L_3 = (L_1)^2 . L_2$ b) $L_4 = L_2 . \varepsilon$ c) $L_5 = L_2 - L_3$ d) $L_6 = L_2 \cap L_4$ e) $L_7 = (L_5)^*$	2*5
2.	a.	Design a deterministic finite automaton to accept, $L = \{w \in \{a,b\}^* \mid n_a(w) \bmod 3 \geq n_b(w) \bmod 2\}$ where n_a and n_b represents the number of a's and number of b's, respectively.	7
	b.	Check whether the string "aabbbb" is accepted by L or not. Justify your answer.	3
3.		Construct a minimized deterministic finite automaton for the automaton given below.	10



4.		Convert an equivalent deterministic finite automaton for the automaton given below. 	10
5.	a	Construct a NFA over Σ = {a, b, c} to accept the language, L = { w | w ϵ Σ^* contain some characters in Σ that appears at most twice in w}.	5
	b	Construct a finite automaton to accept the language, L = { w ϵ {a,b}* | contain strings where |w| mod 2 = 1 or |w| mod 3 = 2 or |w| mod 4 =3} [Hint: |w| represents the length of the string w]	5

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