Reg. No.: 21BPS1364
Name : Mubin

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

Continuous Assessment Test - II March 2023

Programme	:	B.Tech (CSE) and its Specialization	Semester	:	Winter Semester 2022-23
Course Code	:	BCSE304L	Class Nbr(s)	:	CH2022235001246 CH2022235001297 CH2022235001296 CH2022235001245
Course Title	:	Theory of Computation			
Faculty(s)	:	Dr. Amutha S Dr. Prakash P Dr. Kiruthika S Dr. Karmel A	Slot	:	B2+TB2
Time	:	90 Minutes	Max. Marks	:	50

Answer all the Questions

Q. No.	Sub-division	Question Text	Marks
1.		Consider the language, $L = \{w \mid w \text{ is an element of } ab(ab)^n b(ba)^{n+1} \text{ where } n>=0\}$	
	a.	Construct a context-free grammar that generates strings in L	2
	b.	Design a Pushdown Automaton to recognize the language L.	6
	c.	Justify the automaton designed in 1(b) accepts the string "abbba" in L.	2
2.		Consider the context free grammar G: ({S, A, B, C}, {0,1,ϵ}, P, {S}) $S \rightarrow 1AB \mid \epsilon$ $A \rightarrow 1AC \mid 0C$ $B \rightarrow 0S$ $C \rightarrow 1$	
	a.	Derive two strings from G.	2
	b.	Is the grammar ambiguous? Justify your answer.	2
	c.	Construct an equivalent grammar G' in Chomsky Normal form [CNG]	6
3.		Is the language, $L = \{S_k \mid k \geq 0$, where $S_0 = \epsilon$ and $S_k = S_{k-1}a^k b^k$ for all $k > 0\}$ regular? Justify your answer.	10
4.		Construct a DFA for the languages, $L = \{ w \mid w \text{ has exactly two a's } \Sigma = \{ a, b \}\}$ $M = \{ w \mid w \text{ has at least two b's } \Sigma = \{ a, b \} \}$. Using the constructed DFAs, prove that $L \cap M$ is also regular.	10
5.		Consider the context-free grammar G: ({S,A,B,C}, {a, b, c}, P, S) with the set of	10

productions P given below.

$S \rightarrow abAB \mid c$

$A \rightarrow Ba \mid aA \mid Cc$

$B \rightarrow bB \mid b$

$C \rightarrow c$

Construct an equivalent grammar G' in Greibach Normal Form [GNF].

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