

Reg.No :

Name :



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

CONTINUOUS ASSESSMENT TEST 2 – October 2023

Programme	: B.Tech (CSE) and its Specialization	Semester	: Fall Semester 23-24
Course Title	Theory of Computation	Code	: BCSE304L
		Class Nbr(s)	: CH2023240100678 CH2023240100680 CH2023240100679
Faculty (s)	: Dr.T.Benil Dr. Jannath Nisha Dr. R. Rathna	Slot	: G1+TG1
Time	: 90 minutes	Max. Marks	: 50 marks

Answer all the Questions

1. i) $S \rightarrow aA \mid bB$
 $A \rightarrow aS \mid b$
 $B \rightarrow bS \mid a$

Is this grammar regular? Explain why? and why not? (5 Marks)

- ii) Consider the following code and design CFG

int a=10

int b=20

print(a+b) (5 Marks)

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- iii) Explain the steps and techniques involved in simplifying a context-free grammar, and provide an example where you demonstrate the application of these steps to transform a complex grammar into a simpler and more manageable form. (5 Marks)

2. i) Construct Context Free Grammar for the given expression $(a+b)(a+b+01)^*$ (3 Marks)

- ii) Create a Context-Free Grammar for the string $1+2*3$ and give

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- a) Right most Derivation
b) Left most Derivation

	<p>c) Parse tree</p> <p>d) Check the grammar is ambiguous grammar or unambiguous grammar (7 Marks)</p>	
3.	<p>Consider the context-free grammar $G: (\{S,A,B,C\}, \{0,1\}, P, S)$ with the set of productions P given below.</p> $S \rightarrow ABC$ $A \rightarrow 0AS \mid 0$ $B \rightarrow SIS \mid A \mid 11$ $C \rightarrow 1S \mid 0A \mid B \mid 00$ <p>i) Derive any two words from G. (2 Marks)</p> <p>ii) Construct an equivalent grammar G' which is in Chomsky Normal Form. (8 Marks)</p>	10
4.	<p>i) Using Pumping lemma, Prove that the following Language is not a CFL: $L = \{ a^i b^j c^k \mid i < j < k \}$ (5 Marks)</p> <p>ii) A Xerox shop owner closer to a school, inorder to expand his business started selling stationery items also. In the starting he opened the shop with x number of Pens and y number of Note books on a daily basis. Later he added same x number of Whiteners also. This expansion was profitable for him. Construct Push Down Automata (PDA) for a language represented by the above scenario. (10 Marks)</p>	15