



Daffodil International University
Faculty of Science & Information Technology
Department of Computer Science & Engineering
Final Examination, Fall 2024
Course Code: CSE228, Course Title: Theory of Computation
Level: L2 Term: T2 Batch: 64

Time: 02:00 Hrs

Marks:40

Answer ALL Questions

*[The figures in the right margin indicate the full marks and corresponding course outcomes.
All portions of each question must be answered sequentially.]*

Q1	a) Consider the following CFG: $P \rightarrow ABCD$ $A \rightarrow aA \mid cC \mid oD \mid iC$ $B \rightarrow ov \mid ovC$ $C \rightarrow id \mid id-D \mid \epsilon$ $D \rightarrow 0 \mid 1 \mid 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7 \mid 8 \mid 9$ Experiment the above CFG to find out if the above mentioned CFG is ambiguous or not for the string covid-19.	[3]	CO2
	b) Apply the concept of Push Down Automata (PDA) to accepts the language over alphabet $\{0,1,c\}$: $L = \{wcw^R, \text{ where } w^R \text{ is the reverse of } w \text{ and } w \in \{0+1\}^*\}$. After designing the PDA, Experiment the validity of the string 10011c11001	[7]	
Q2	a) Consider the following CFG: $S \rightarrow OSS \mid A$, $O \rightarrow + \mid * \mid /$, $A \rightarrow a \mid b \mid c$ Analyze this CFG for the string $+a * b / ca$ to Perform the Left most derivation, Right most derivation, also Generate Parse Tree	[5]	CO3
	b) Drive the following regular expression into CFG: $0^*10(0+1)^*$ Using the generated CFG: Discover whether the strings 101001, and 011010, are accepted or not accepted.	[5]	
Q3	Consider the following grammar: $S \rightarrow ASB$ $A \rightarrow aASAB \mid a \mid c$ $B \rightarrow SbS \mid A \mid bb$ Perform the following steps: i) Eliminate useless symbols from the grammar. ii) Remove unit productions from the grammar. iii) Eliminate epsilon (ϵ)-productions from the grammar. iv) Convert the resulting grammar into Chomsky Normal Form (CNF).	[10]	CO3
Q4	a) Propose the Pumping Lemma for the language $A = \{a^i b^j a^j \mid i, j \geq 0\}$ is not regular.	[5]	CO4
	b) Determine a Turing Machine which recognizes the languages $L = \{a^n b^{2n} \mid n \geq 1\}$	[5]	