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 → ABCD** **A → aA | cC | oD | iC** **B → ov | ovC** **C → id | id-D | ε** **D → 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 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**, where **w^R** is the reverse of w and w ∈ {0+1}* }. After designing the PDA, **Experiment** the validity of the string **10011c11001**	[7]	
Q2	a)	*Consider the following CFG:* $S \rightarrow O\ S\ S \mid A, \quad O \rightarrow + \mid * \mid /, \quad A \rightarrow a \mid b \mid c$ ***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 → ASB** **A → aASAB | a | ϵ** **B → SbS | A | 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 = {$a^i b^j a^{ij}$ | i, j>= 0} is not regular.	[5]	CO4
	b)	**Determine** a Turing Machine which recognizes the languages L = { $a^n b^{2n}$ | n>= 1}	[5]	