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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]	