M.G.M.'s College of Engineering, Nanded

Department of Computer Science & Engineering

Academic Year 2025-26(Odd Sem)

Practice Questions Set- II

Class: TY (CSE) – A & B **Sub: Theory of Computation**

Q. No.	Question	BT Level	CO Achieved
1	Define Context Free Grammar (CFG) and explain with suitable example.	Understand	CO1
2	Briefly describe the following terms with suitable example: a) Derivation tree b) Leftmost derivation c) Rightmost derivation d) Ambiguous grammar	Understand	CO1
3	Construct a grammar generating following languages : a) $L = \{ W W^T \mid W \varepsilon \{a, b\}^* \}$ b) $L = \{ a^n b^n c^i \mid n >= 1, i >= 0 \}$ c) $L = \{ a^m b^n \mid m>=1 \text{ and } n >= 1\}$	Apply	CO1, CO3
4	Find the language generated by the following grammars: a) $S \rightarrow 0\ S\ 1 \mid 0\ A\ 1$, $A \rightarrow 1\ A\ 0 \mid 0$ b) $S \rightarrow b\ A\ b$, $A \rightarrow b\ A\ b \mid a$ c) $S \rightarrow a\ S \mid b\ S \mid a \mid b$	Apply	CO1, CO3
5	Determine whether the following grammars are ambiguous: a) $S \rightarrow 0 \mid 0\ 1\ S\ 1 \mid 0\ A\ 1$, $A \rightarrow 1\ S \mid 0\ A\ A\ 1$ b) $S \rightarrow a\ B \mid a\ b$, $A \rightarrow a\ A\ B \mid a$, $B \rightarrow A\ B\ b \mid b$	Analyze	CO3
6	Consider the following productions: $S \rightarrow a\ D \mid b\ C$, $C \rightarrow a\ S \mid b\ C\ C \mid a$, $D \rightarrow b\ S \mid a\ D\ D \mid b$ For the string a a a b b a b b b a, find a) Leftmost derivation b) Rightmost derivation c) Parse tree or Derivation tree	Apply	CO1
7	Eliminate unit production from the following grammar: 1. $S \rightarrow A \mid B \mid C$ $A \rightarrow a\ A\ a \mid B$ $B \rightarrow b\ B \mid b\ b$ $C \rightarrow a\ C\ a\ a \mid D$ $D \rightarrow b\ a\ D \mid a\ b\ D \mid a\ a$ 2. $S \rightarrow A\ S\ B \mid \wedge$, $A \rightarrow a\ A\ S \mid a$, $B \rightarrow S\ b\ S \mid A \mid bb$ 3. $S \rightarrow 0\ A\ 0 \mid 1\ B\ 1 \mid BB$, $A \rightarrow C$, $B \rightarrow S \mid A$, $C \rightarrow S \mid \wedge$	Apply	CO2, CO3

8	**Construct a reduced grammar equivalent to the following grammar (remove useless symbols):** **a) S → A B C | B a B A→a A | B a C | a a a B→b B b |a C →C A | AC** **b) S →A B | A C A→a A b |b A a | a B→b b A |a a B | A B** **C →a b C a | a D b D→ b D | a C** **c) S → 0A 0 , A→S 1 | 1 C C | D 0 A, C→011 |D D,** **E→0 C, D→0 D A** **d) S →A B |C A, B → B C | A B , A→a, C → a B | b** **e) S →a A a , A→b B B, B → a b, C → a B**	**Apply**	**CO2, CO3**
9	**Eliminate null productions from the following grammar:** **a) S→ A B | A B C A→ B A |B C | ^ | a B→ A C | C B |^ | b** **C → B C | A B | A | c** **b) S → a S | A B , A → ^ , B → ^ , D → b** **c) S → A B A C, A→a A | ^ , B→b B |^ , C → c** **d) S →A a b | a a B A → ^ B → b b A | ^**	**Apply**	**CO2, CO3**
10	**Consider the following grammar:** **S → A S B | ^ , A → a A S | a , B → S b S| A | b b** **a. Remove Useless symbol if any** **b. Eliminate null productions** **c. Eliminate unit productions**	**Apply**	**CO2, CO3**
11	**Explain Chomsky hierarchy of languages.**	**Understand**	**CO1**

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