**United College of Engineering & Research, Prayagraj**

**Department of Computer Science & Engineering**

**Automata Theory(KCS-402)**

**Assignment-3**

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| **Q. No.** | **Question** | **CO** | **Bloom’s level** |
|  | **Section-A** |  |  |
| 1 | Construct the CFG for the regular expression (0+1)\*. | CO4 | L2 |
| 2 | Construct context free grammar for the language, L= { an bn |n ≥ 0 }. | CO4 | L2 |
| 3 | Explain Chomsky Normal Form and Greibach Normal Form. | CO4 | L1 |
| 4 | Define Reduced grammar. | CO4 | L1 |
| 5 | Define nullable variable and null production. | CO4 | L1 |
|  | **Section-B** |  |  |
| 6 | Explain in detail about the following:-  (a) Closure properties of Context Free Languages.  (b) Decidability-Decision properties of Regular Languages. | CO4 | L2 |
| 7 | Design the CFG for the following language:  i) L = {0m1n | m ≠ n & m, n ≥ 1}  ii) L = {al bmcn | l + m = n & l,m ≥ 1} | CO4 | L4 |
| 8 | Prove that the following Language L = {anbncn } is not Context Free. | CO4 | L4 |
| 9 | Convert the following CFG into CNF  S → XY | Xn | p  X → mX | m  Y → Xn | o | CO4 | L3 |
| 10 | Convert the following CFG into equivalent Greibach Normal Form:  S🡪AA, A🡪SS, S🡪a, A🡪b | CO4 | L3 |
| 11 | Show that context free grammar(CFG) with productions  S🡪a | Sa | bSS | SSb | SbS  is ambiguous. | CO4 | L2 |
| 12 | Convert the following grammar into Chomsky Normal Form(CNF):-  S🡪ABa, A🡪aab, B🡪Ac | CO4 | L3 |
| 13 | Consider the following grammar:-  S🡪A1B, A🡪0A/ ε, B🡪0B/1B/ ε  Find leftmost and rightmost derivation of strings 00101. | CO4 | L2 |
| 14 | Find context free grammar for the following languages with (n, m, k ≥ 0 );-  (a) L= {anbnck ! k ≥ 3}  (b) L={ambnck ! n=m or m ≤ k } | CO4 | L3 |
| 15 | Given context free grammar, how do you determine that grammar as  (a) Empty or Non-Empty  (b) Finite or Non-Finite  (c) Whether a string x belong to languages of grammar. | CO4 | L3 |

**CO** - Course Outcome

**Bloom’s Levels**

1- Remembering 2-Understanding 3-Applying

4-Analyzing 5-Evaluating 6-Creating