**Design context-free grammar (CFG) for the following languages:**

1. {x2n # y3n | n>= 1} Here, Σ={x,y,#}
2. L = {am bn c3n d2m | where m,n>=1}
3. L = {xi yj zk | where i=k or j=k and i, j, k >=0}
4. L = {w is consisted of {0,1} | w is odd and mid symbol is 0}
5. L = { w is considered of {0,1} | w is of even length & w starts and ends with different symbol }
6. L = { ai bj ck | where i≠j and k≥1 }
7. L = { ai bj ck | 2i + 3j >= 6 and 4i - 8j >= -16 and k >= 1 }
8. L = { am+n c3n d2m | n,m >= 2 }
9. L = { cp # dq gr h | q=4p, p,q>=0 and r>2 }
10. L = { am bn cu dv | m= , v= , m,n,u,v > 0 }

**Consider the following *Context-free grammars(CFG)* and answer according to it:**

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| 1. | S → S + S | S ∗ S | A | B  A → aA | 1  B → bB | 2 | With the help of Top-Down Parse Trees, find-out if the grammar is Ambiguous or not for the string “bbb2 + aa1 + b2” |
| 2. | S → S + S | S - S | (S) | T  T → X \* X | X % X | X  X → x | y | z | Y  Y → 0 | 1 | 2 | 3 | With the help of Leftmost derivation, derive the following string “(x + 2\*y) - (3\*z + 1)” |
| 3. |  | 1. With the help of Top-Down Parse Trees, figure out if the grammar is Ambiguous or not for the string “x + y + z = 2” 2. Show the Right Most Derivation for the string “-26x + 3y - 8z = -83” |
| 4. | S → AS | BAC  A→ A1 | 0A1 | 0B1 | B  B → 0B | 0 | €  C → 1 | € | With the help of Top-Down Parse Trees, find-out if the grammar is Ambiguous or not for the string 00011111 |
| 5. | E → E+E | E-E | (E) | V  V → p | q | r | X  X → X\*X | X%X | Y  Y → 0 | 1 | With the help of Leftmost derivation, find-out if the grammar is Ambiguous or not for the string p+(0\*1%0)-r |
| 6. |  | Consider the following context-free grammars (CFG). With the help of Top-Down Parse Tree decide whether the grammars are ambiguous or not: |
| 7. |  | Consider the following context-free grammars (CFG). With the help of Top-Down Parse Tree decide whether the grammars are ambiguous or not: |

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