Chomsky Normal Form

Tag CFL

A context free grammar (CFG) is in Chomsky Normal Form (CNF) if all production rules satisfy one of the following conditions:

- A non-terminal generating a terminal (e.g.; X→x)
- A non-terminal generating two non-terminals (e.g.; X→YZ)
- Start symbol generating ε. (e.g.; S→ ε)

Steps:

Step 1. Eliminate start symbol from RHS.

If start symbol S is at the RHS of any production in the grammar, create a new production as:

S0→S where S0 is the new start symbol.

Step 2. Eliminate null, unit and useless productions.

Step 3. Eliminate terminals from RHS if they exist with other terminals or non-terminals. e.g,; production rule X→xY can be decomposed as:

X→ZY

Z→x

Step 4. Eliminate RHS with more than two non-terminals.

e.g,; production rule X→XYZ can be decomposed as:

X→PZ

P→XY

CFG to CNF

A website to convert Context Free Grammar(CFG) to equivalent Chomsky Normal Form(CNF)

https://devimam.github.io/cfgtocnf/

▼ Past Paper Qs

Convert to CNF and you must show all the intermediary four steps in the order studied to score full marks:

S → SS | AB | B

A → aAAa

B → bBb | bb | Δ

C → CC | a

D → aC | bb

Convert the following grammar to Chomsky Normal Form Grammar. Show all the
intermediary steps in the correct order clearly to score full marks.

S → aAbB | ABC | a
A → aA | a | CD
B → CbC | b
C → S | Δ
D → CC | Db
E → S | Δ

Convert the following grammar to Chomsky Normal Form Grammar. Show all the intermediary steps in the correct order clearly to score full marks.

S → aAbB | ABC | a

A → aA | a | CD

B → CbC | b

C → CC | Δ

D → CC | Db

E → EE | Δ

CNF: Convert the following CFG to CNF

S→ASA|aB

A→B|S

B→b|bD | Δ

C → CC|aa|AB

D → DD