**Chapter 10: CONVERSIONS – IV**

**Topic – 1: CFG To PDA Conversion**

**Steps Involved**

* **Step 1:** Convert **CFG** to **GNF**.
* **Step 2:** **PDA** will have just **one** state.
* **Step 3:** **CFG’s** initial symbol will be **PDA’s** initial symbol too.
* **Step 4:** Add this rule for **non-terminals**:

**δ(q, Ԑ, A) = δ(q, α)**

**Production rule is A 🡪 α**

* **Step 5:** Add this rule for **terminals**:

**δ(q, a, a) = δ(q, Ԑ)**

**Example**

**Ques: Convert the given CFG to PDA.**

**S 🡪 0S1 | A**

**A 🡪 1A0 | S | Ԑ**

**Ans:**

**Removing unit productions:**

**S 🡪 0S1 | 1S0 | Ԑ**

**CFG to GNF:**

**S 🡪 0SX | 1SY | Ԑ**

**X 🡪 1**

**Y 🡪 0**

**PDA IDs:**

**δ(q, Ԑ, S) = δ{(q, 0SX) | (q, 1SY) | (q, Ԑ)}**

**δ(q, Ԑ, X) = δ(q, 1)**

**δ(q, Ԑ, Y) = δ(q, 0)**

**δ(q, 0, 0) = δ(q, Ԑ)**

**δ(q, 1, 1) = δ(q, Ԑ)**

**Example – II**

**Ques: Convert the given CGF into PDA & test if it accepts 0104.**

**S 🡪 0BB**

**B 🡪 0S | 1S | 0**

**Ans: The given CFG is already a GNF.**

**Construct the production rules accordingly.**

**δ(q, 010000, S)**

**⊢ δ(q, 010000, 0BB)**

**⊢ δ(q, 10000, BB)**

**⊢ δ(q, 10000, 1SB)**

**⊢ δ(q, 0000, SB)**

**⊢ δ(q, 0000, 0BBB)**

**⊢ δ(q, 000, BBB)**

**⊢ δ(q, 000, 0BB)**

**⊢ δ(q, 00, BB)**

**⊢ δ(q, 00, 0B)**

**⊢ δ(q, 0, B)**

**⊢ δ(q, 0, 0)**

**⊢ δ(q, Ԑ)**

**ACCEPT**

**Note!**

**🡪 Start symbol is a non-terminal, though shocking.**