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27/10

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Experiment 3:-

Q1) Explain chomskey hierarchy in detail.

→ - A grammar can be classified on the basis of production rules
- chomskey classified grammers into the following types:

1. Type 3 : Regular grammer
2. Type 2 : Context free grammer
3. Type 1 : Context sensitive grammer.
4. Type 0 : Unrestricted grammar.

Type 3 OR Regular grammer.
⇒ A grammer is called type 3 or regular grammer if all its production are of the following forms:

$$A \rightarrow \epsilon$$
$$A \rightarrow a$$
$$A \rightarrow aB$$
$$A \rightarrow Ba$$

where $a \in \Sigma$ and $A, B \in V$

A language generated by Type 3 grammer is known as regular language.

Type 2 OR Context free Grammer

→ A grammer is called Type 2 or context free gramma if all its production are of follows form:

$$A \to \alpha$$

where, $A \in V$ and $\alpha \in (V \cup T)^*$

V is set of var, and T is set of terminals

→ The lang. generated by type 2 grammer is called as a context free lang. a regular lang. but not the reverse.

Type 1 OR context sensitive Grammer.

→ A grammer is called a Type 1 or context sensitive grammer is called a Type 1 or context are of the following form.

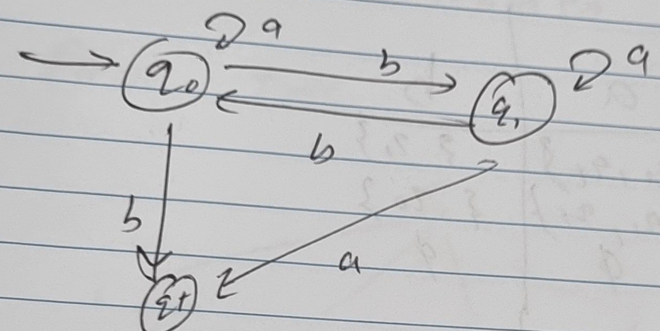
$$\alpha \to \beta$$

where, β is atleast as long as α.

Q2) Constant finite Automatic recognize L(G) where G is grammer given by:

$S \to aS \mid bA \mid b$
$A \to aA \mid bS \mid a$

→



Grammer (G) = (V, T, S, P).

V → {A, S}
T → {a, b}
S → S
P → S → aS | bA | b
A → aA | bS | a

The above grammer is non equal to final automata defined as:

M → (Q, Σ, δ, q_0, F)
Q → {q_0, q_1, q_f}
Σ → {a, b}
q_0 → q_0
F → {q_f}.

where q_0 corresponds to 'S' in above grammar
q_1 corresponds to 'A'

Transition Table :- (δ)

$Q \backslash \Sigma$	a	b
q_0	$\{q_0, q_f\}$	$\{q_1\}$
q_1	$\{q_1, q_f\}$	$\{q_0\}$
q_f	ϕ	ϕ

Q3) Consider the following grammar.

$S \to ictS \mid ictSeS \mid a$

$C \to b$.

→ For string 'ibtibtaea' find following

i) LMD

ii) RMD

iii) Parse Tree.

iv) Check if above grammar is ambiguous.

i) LMD.

$S \to iCtS$

$S \to ibtS$

$S \to ibtiCtSeS$

$S \to ibtibtaeS$

$S \to ibtibtaea$.

ii) LMD.

⇒ $S \to ictS$

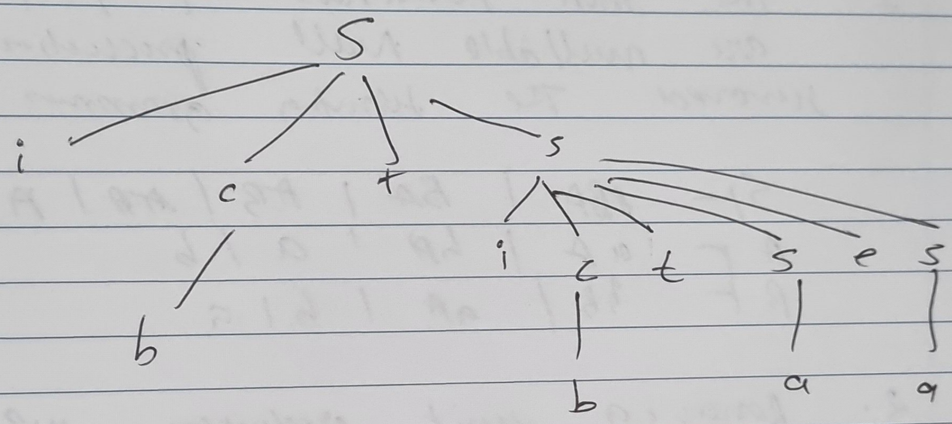
$S \to ictictSeS$

$S \to ictictaea.$

$S \to ictebtaea$

$S \to ibtebtaea.$

iii) Parse Tree.



iv) The above grammer is ambigous grammer due to dangling if problem

The set of productions after above changes is:

$S \to ABA \mid BA \mid AB \mid AA \mid C_aA \mid C_bA \mid a \mid b \mid C_bB \mid C_aA.$

$A \to C_aA \mid C_aA \mid a \mid b$

$B \to C_bA \mid C_aA \mid b \mid a$

$C_a \to a$

$C_b \to b$

Q4) Convert the following grammar to CNF form

$S \to ABA \mid bA \mid \epsilon$
$A \to aA \mid bB \mid aA \mid \epsilon$
$B \to$

⇒ Sol^n

1. The non-terminals $\{S, A, B\}$ are nullable. Null productions are removed. The resulting grammar is.

$S \to ABA \mid BA \mid AB \mid AA \mid A \mid B.$
$A \to aA \mid bA \mid a \mid b$
$B \to bB \mid aA \mid b \mid a$

2. Removing unit production we get

$S \to ABA \mid BA \mid AB \mid AA \mid aA \mid bA \mid a \mid b \mid bB \mid aA$

$A \to aA \mid bA \mid a \mid b$
$B \to bB \mid aA \mid b \mid a$

3. Every symbol in α, in product of the form $A \to \alpha$ where $|\alpha| \geq 2$ should be a variable. This can be done by adding two productions

$$C_a \to a$$
$$C_b \to b.$$

DPDA.