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Page No. ______
Date

TOC Test-02

Answer to the ques. no: 1

Ambiguous CFG:

A CFG is said to ambiguous if there exists more than one derivation ~~th~~ tree for the given input string i.e. more than one Left Most - Derivation Tree (LMDT) or Right Most Derivation Tree (RMDT).
If the grammar is said to be ambigious or it has ambiguity, then it is not good for compiler construction. No method can automatically detect and remove ambiguity by re-writting the whole grammer without ambiguity.

Let, $G = (V, T, P, S)$ is a CFG is said to be ambigious if and only if there exist a string in T^* that has more than one parse tree.

Here, V is a finite set of variables.
T is a finite set of terminals
P is a finite set of production of the form, $A \to a$, where A is a variable and $\alpha \in (V \cup T)^*$ S is a designated variable called the start symbol.

Ex. $E \to E + E \mid id$

We can create two parse tree from this grammer to obtain a string id + id + id :

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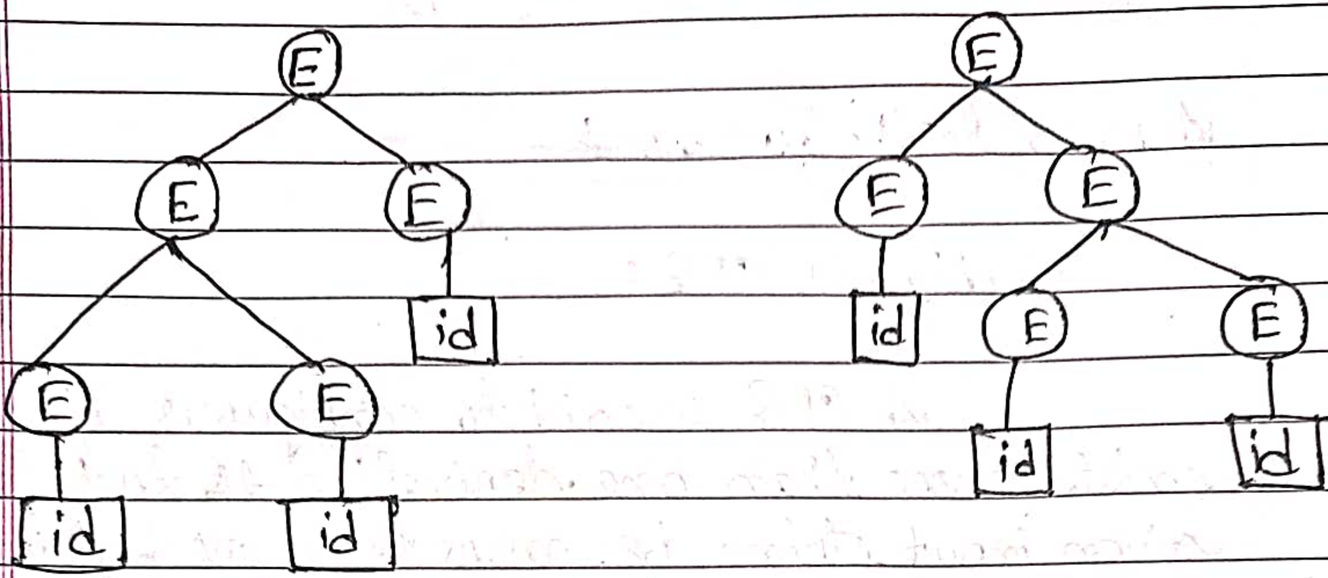


<u>Inherently Ambigious CFG:</u>

If every content-free grammer G with language $L = L(G)$ is ambigious, then L is said to be inherently ambiguous ~~Languag~~ Language. Ambiguity is a property of grammer not language.

For example,

$$L = \{a^n b^n c^m\} \cup \{a^n b^m c^m\}$$

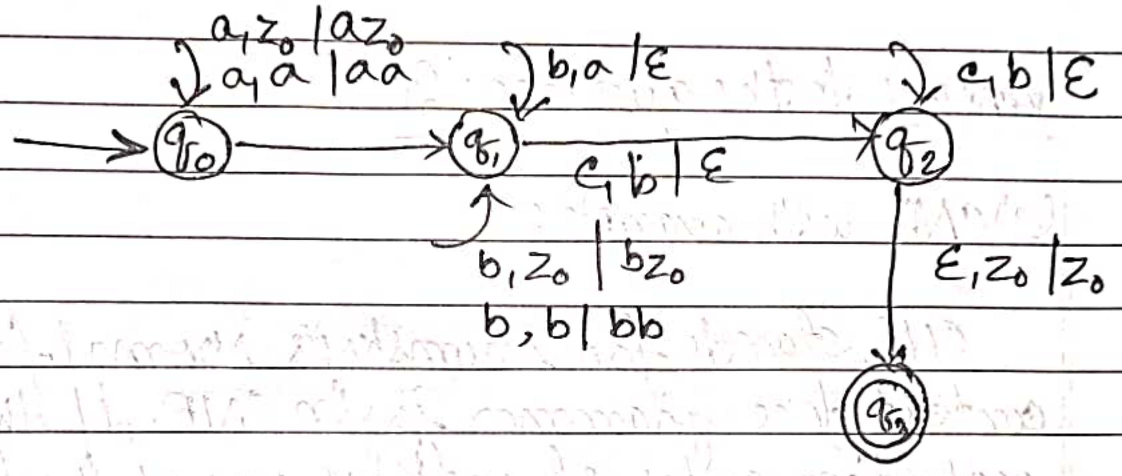
Q.(4.)

(i) Given that,

$$L = \{a^n b^{n+m} c^m : n >=, m >= 1\}$$

$$= a^n b^n b^m c^m$$

$$a = \{abbc, a^2b^2b^2c^2, a^4b^4b^4c^4, \ldots\}$$

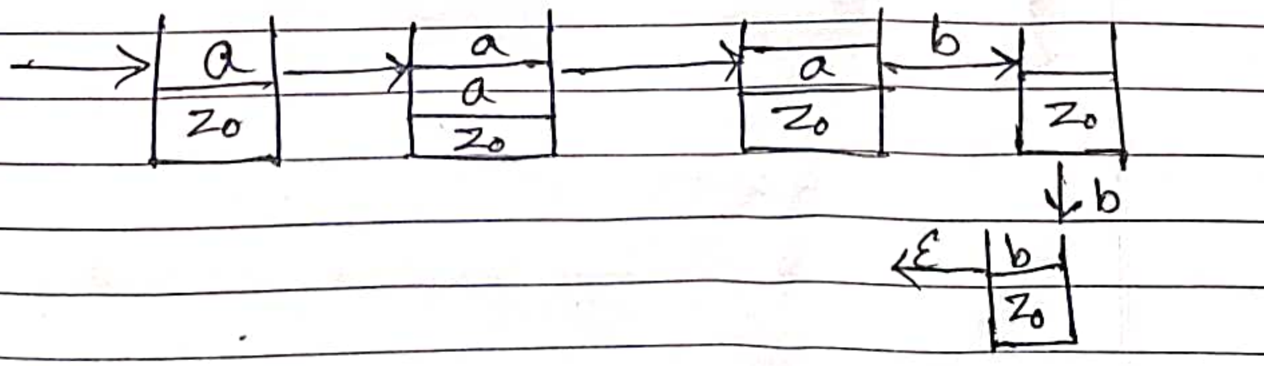


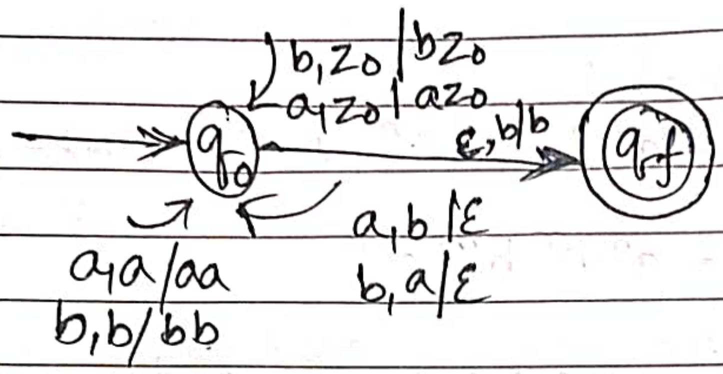
(ii) Given that,

$$L = \{w : n_a(w) < n_b(w)\}$$

$$= \{b, abb, aabbb, \ldots\}$$

Logic: b should remain at the top of stack at the end of string. (ε is input). push a or push b, if top = a, input = b, pop. If top = b, input = a, pop.





Answer to the ques. no: 3

(a) CNF with example:

CNF stands for chomsky's Normal form. A context free grammer is in CNF. If the ~~proe~~ production rules ~~st~~ satisfy one of the following conditions.

- If there is start symbol generating ~~S~~ ε.
  Ex. $A \rightarrow \varepsilon$.

- If a non-terminal genrates two non-terminals. Ex. $S \rightarrow AB$.

- If a non-terminal generates a terminal
  Ex. $S \rightarrow a$.

CNF Example:

Let,

$A = \{ w \mid w \in \{a,b\}^* \text{ and } w = w^R \}$

CNG in CNF

$S \to AU \mid BU \mid a \mid b \mid \varepsilon$	$S \Rightarrow BV$
$T \to AU \mid BV \mid a \mid b$	$\Rightarrow bV$
$U \to TA$	$\Rightarrow bTB$
$A = a$	$\Rightarrow bAUB$
$B = b$	$\Rightarrow baUB$
	$\Rightarrow baTAB$
	$\Rightarrow baaAB$
	$\Rightarrow baaaB$
	$\Rightarrow baaab$.

Derivation of baaab

(b) GNF with example:

GNF stands for Grebach normal form. A CGF is in GNF. If all the production rules satisfy one of the following conditions.

- A start symbol ~~genral~~ generating ε.
  Ex. $S \to \varepsilon$
- A non-terminal generating a terminal
  Ex. $A \to a$.
- A non-terminal generating a terminal which is followed by one any ~~num~~ number

of non-terminals.

Ex. $S \rightarrow aASB$.

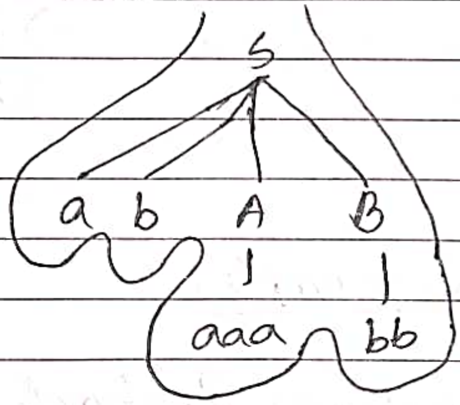
GNF Example:

$G1 = \{S \rightarrow aB|aB,\ A \rightarrow aA|a,\ B \rightarrow bB|b\}$
$G2 = \{S \rightarrow aAB|aB,\ A \rightarrow aA|\varepsilon,\ B \rightarrow bB|\varepsilon\}$

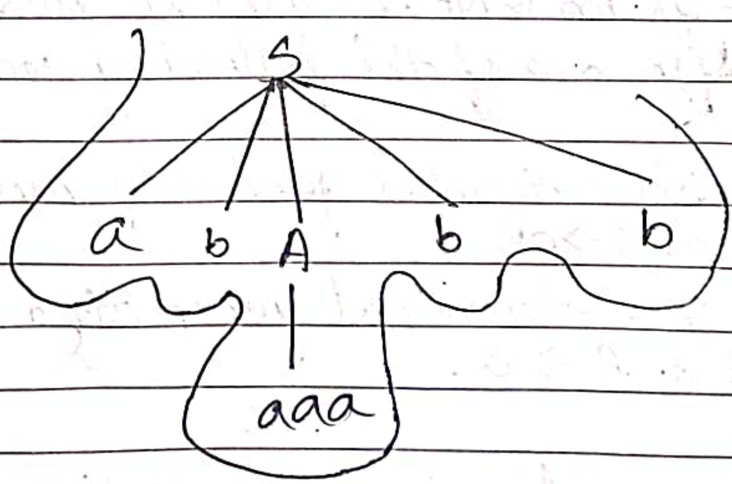
Answer to the ques. no: 2

→ abaaabb this generate both Grammar

(I)



(II)



So both are equal