

Tutorial - 09

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Q Do left factoring.

$$(i) \quad \begin{aligned} A &\rightarrow aAB \mid aA \mid a \\ B &\rightarrow bB \mid b \end{aligned}$$

$$\Rightarrow \quad \begin{aligned} A &\rightarrow aA' \\ A' &\rightarrow AB \mid A \mid \epsilon \end{aligned}$$

Doing it again

$$\begin{aligned} A &\rightarrow aA' \\ A' &\rightarrow AB' \mid \epsilon \\ B' &\rightarrow B \mid \epsilon \end{aligned}$$

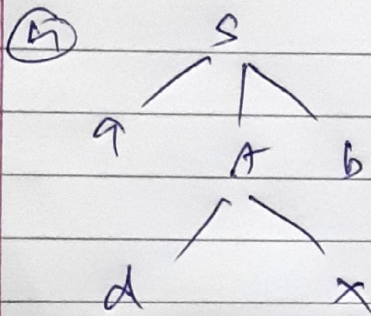
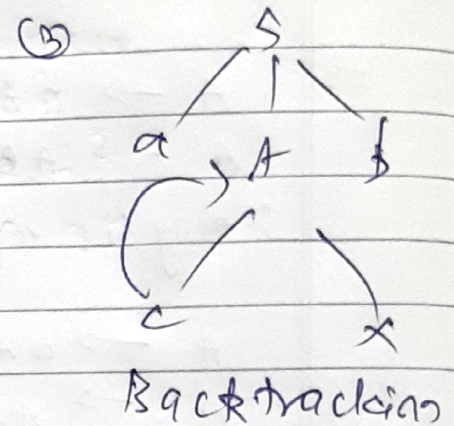
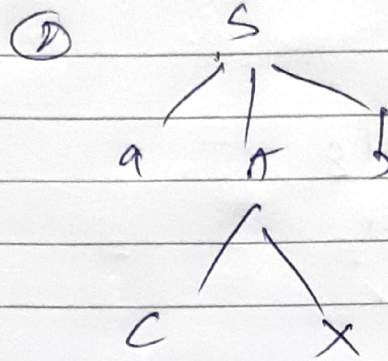
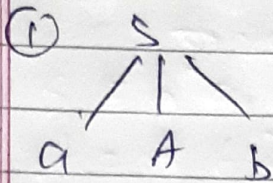
$$(ii) \quad \begin{aligned} A &\rightarrow aAB \mid aBc \mid aAc \\ A &\rightarrow aA' \\ A' &\rightarrow AB \mid Bc \mid Ac \end{aligned}$$

$$\begin{aligned} A &\rightarrow aA' \\ A' &\rightarrow AB' \mid Bc \\ B' &\rightarrow B \mid \epsilon \end{aligned}$$

Q-2 Explain recursive descent parsing

Ans A parser table that uses a set of recursive procedures to recognize its input with no backtracking is called a recursive descent parser. Implementing a recursive descent parser for a grammar it must not be left recursive but must be left factored.

eg). $S \rightarrow aAb|aBb$
 $A \rightarrow cx|dx$
 $B \rightarrow xe$



next production.

Q3

$E \rightarrow TE|$
 $E \rightarrow +TE'|E$
 $T \rightarrow FT|$
 $TI \rightarrow *FT'|E$
 $F \rightarrow (E)|id.$

first

E
 $E|$
 T
 TI
 F

$\{ (, id \}$
 $\{ +, E \}$
 $\{ (, id \}$
 $\{ *, E \}$
 $\{ (, id \}$

follow

$\{ \$,) \}$
 $\{ id \$ \}$
 $\{ +,), \$ \}$
 $\{ t,), \$ \}$
 $\{ *, +,), \$ \}$

$$\begin{aligned}
 2) \quad S &\rightarrow ACB \mid CbB \mid Ba \\
 A &\rightarrow da \mid BC \\
 B &\rightarrow g \mid e \\
 C &\rightarrow h \mid e
 \end{aligned}$$

	first
S	{d, g, h, b, a, e}
A	{d, g, h, e}
B	{g, e}
C	{h, e}

	follow
S	{\$, }
A	{\$, h, g}
B	{\$, a, h, g}
C	{g, \$, b, h}

$$\begin{aligned}
 3) \quad S &\rightarrow A \\
 A &\rightarrow aB \mid Ad \\
 B &\rightarrow b \\
 C &\rightarrow g
 \end{aligned}$$

$$\begin{aligned}
 A &\rightarrow aB \mid A' \\
 A' &\rightarrow dA' \mid \epsilon
 \end{aligned}$$

	first
S	{a}
A	{a}
B	{b}
C	{g}
A'	{d, \epsilon}

	follow
S	{\$}
A	{\$}
B	{\$}
C	{d, \$}
A'	{\epsilon, NA}

$$\begin{aligned}
 4) \quad S &\rightarrow (L) \mid a \\
 L &\rightarrow SL' \\
 L' &\rightarrow ,SL' \mid \epsilon
 \end{aligned}$$

	first
S	{(, a}
L	{(, a}
L'	{, , \epsilon}

	follow
S	{), , \$}
L	{), }
L'	{), }

5)

 $S \rightarrow AaAb \mid BbBa$ $A \rightarrow \epsilon$ $B \rightarrow \epsilon$

first

 $S = \{a, b\}$ $A = \{\epsilon\}$ $B = \{\epsilon\}$

follow

 $\{ \$ \}$ $\{a, b\}$ $\{a, b\}$