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Ans to the Qus no-1

We know

$S \to U$
$U \to TaU$
$U \to TaT$
$T \to aTbT$
$T \to d$

Here a grammer is said to be LL(1) if it's parsing table has no multiple entries in any cell.

	First	Follow
$S \to U$	{a, b, d}	{$}
$U \to TaU \mid TaT$	{a, b, d}	{a, b, $}
$T \to aTbT \mid bTaT \mid d$	{a, b, d}	{$}

Parse table on Basic of first and follow:

	a	b	d	$
S	U	U	U	
T	$T \to aTbT$	$T \to bTaT$	$T \to d$	
U	$U \to TaT$ $U \to TaU$	$U \to TaT$ $U \to TaU$	$U \to TaT$ $U \to TaU$	

∴ The given grammer is not LL(1) grammer

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Ans to the Qus no - 2

2. (i) $S \to 0A \mid 1B$

$A \to 0AA \mid 1S \mid 1$

$B \to 1BB \mid 0S \mid 0$

	First	Follow
$S \to 0A \mid 1B$	$\{0, 1\}$	$\{\$\}$
$A \to 0AA \mid 1S \mid 1$	$\{0, 1\}$	$\{\$\}$
$B \to 1BB \mid 0S \mid 0$	$\{1, 0\}$	$\{\$\}$

Parse table based on first and follow

	0	1	$
S	$S \to 0A$	$S \to 1B$	
A	$A \to 0AA$	$A \to 1S$ $A \to 1$	
B	$B \to 0S$ $B \to 0$	$B \to 1BB$	

We got 2 el. entries so it may generate one more parse trees for some input string. So it is an ambiguous grammer.

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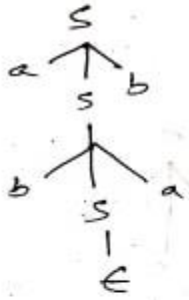
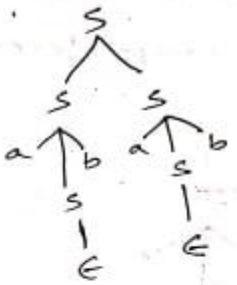
2 (ii) $S \rightarrow aSb \mid bSa \mid SSb$

Let place the input string and we get possible parse trees are.

1.



2.



We got two parse trees so it is an ambigious grammer.

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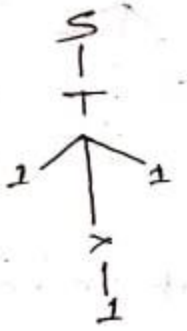
2. (3) $S \rightarrow 1S \mid T$

$T \rightarrow 1X \mid X$

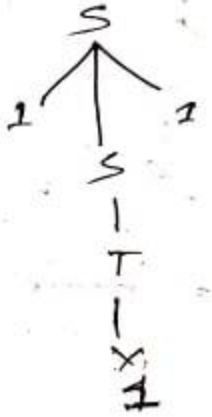
$X \rightarrow 0X0 \mid 1$

Lets take the input string 111 and we get possible parse trees are.

1.



2.



So we get 2 parse trees which mean that it is an ambigious grammer.

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Ans to the Qur no 3

content free grammer.

$S \rightarrow A\,a\,A\,b \mid B\,b\,B\,a$

$A \rightarrow \epsilon$

$B \rightarrow \epsilon$

Now we will complete first and follows functions

First (S) = {a, b} if we put

$S \rightarrow A\,a\,A\,b$

$S \rightarrow a\,A\,b$ when $A \rightarrow \epsilon$

also. $S \rightarrow B\,b\,B\,a$

$S \rightarrow b\,B\,a$ when $B \rightarrow \epsilon$

First (A) = First (B) = {ϵ}

Follow (S) = {$}

Follow (A) = Follow (B) = {a, b}

The LL(1) parsing table is given in next page.

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	a	b	$
S	S → AaAb	S → BbBa	
A	A → ∈	A → ∈	
B	B → ∈	B → ∈	

stack movement.

Stack	Input	Action
$ S	ba $	S → BbBa
$ aBbB	ba $	B → ∈
$ aBb	ba $	
$ aB	a $	B → ∈
$ a	a $	
$	$	Accept