American International University- Bangladesh (AIUB)
Faculty of Engineering

Course Name :	**Compiler Design**		
Semester :	**Fall 2021-22**	**Section:**	**F**
Faculty :	**Mahfujur Rahman**	**Department:**	**CSE**

Assignment No :	**1**
Assignment Name :	**Finalterm**

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1. Here,

$S \rightarrow SaA \mid A$

$A \rightarrow AbB \mid B$

$B \rightarrow cSd \mid e$

Now,

First (S) = {c, e}

First (A) = {c, e}

First (B) = {c, e}

Follow (S) = {a, d, $}

Follow (A) = {a, d, $, b}

Follow (B) = {a, d, $, b}

Variables	a	b	c	d	e	$
S			S→SaA S→A		S→SaA S→A	
A			A→AbB A→B		A→AbB A→B	
B			B→cSd		B→e	

From this table, we saw multiple data in one cell.

As a result, the grammar is not LL (1) grammar.

2. 1) Here,

$S \rightarrow 0A \mid 1B$

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

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

Now,

First (S) = {0, 1}

First (A) = {0, 1}

First (B) = {0, 1}

Follow (S) = {$}

Follow (A) = {$}

Follow (B) = {$}

Variables	0	1	$
S	$S \rightarrow 0A$	$S \rightarrow 1B$	
A	$S \rightarrow 0AA$	$A \rightarrow 1S$ $A \rightarrow 1$	
B	$B \rightarrow 0S$ $B \rightarrow 0$	$B \rightarrow 1BB$	

From this table, we see multiple entries in some cell. It may produce one or multiple trees for same input. As a result, it is ambiguous grammar.

2) Here,

$S \rightarrow aSb|bSa|SS|\epsilon$

Now, First (S) = $\{a, b, \epsilon\}$ Follow (S) = $\{b, a, \$\}$

Variables	a	b	$
S	$S \rightarrow aSb$ $S \rightarrow SS$ $S \rightarrow \epsilon$	$S \rightarrow bSa$ $S \rightarrow SS$ $S \rightarrow \epsilon$	$S \rightarrow \epsilon$

From this table, we see tripple entries in some cell. It may produce one or mutiple trees for same input. So, it is ambiguous grammar.

3) Here,

$S \rightarrow 1S1 | T$

$T \rightarrow 1X1 | X$

$X \rightarrow 0X0 | 1$

Now,

First (S) = {0, 1} Follow (S) = {1, $}

First (T) = {0, 1} Follow (T) = {1, $}

First (X) = {0, 1} Follow (X) = {0, 1, $}

Variables	0	1	$
S	S → T	S → 1S1 S → T	
T	T → X	T → 1X1 T → X	
X	X → 0X0	X → 1	

From this table, we see multiple entries in some cell. It may produce one or multiple trees for same input. As a result, it is ambiguous grammar.