

# Q3. LR Parsing tables.

Non-terminal	FIRST
S	{a}
A	{a}
B	{b, c}
C	{c, d}

## Closure table

Goto	Kernel	State	Closure
	$\{[S \rightarrow \cdot a, \$]]\}$	0	$\{[S \rightarrow \cdot a C, \$]]\}$
(0, a)	$\{[S \rightarrow a \cdot C, \$]]\}$	1	$\{[S \rightarrow a \cdot C, \$]];$ $[C \rightarrow \cdot c C, \$]];$ $[C \rightarrow \cdot d, \$]]\}$
(1, c)	$\{[S \rightarrow a \cdot C, \$]]\}$	2	$\{[S \rightarrow a C \cdot, \$]]\}$
(1, c)	$\{[C \rightarrow c \cdot C, \$]]\}$	3	$\{[C \rightarrow c \cdot C, \$]];$ $[C \rightarrow \cdot c C, \$]];$ $[C \rightarrow \cdot d, \$]]\}$
(1, d)	$\{[C \rightarrow d \cdot, \$]]\}$	4	$\{[C \rightarrow d \cdot, \$]]\}$
(3, c)	$\{[C \rightarrow c C \cdot, \$]]\}$	5	$\{[C \rightarrow c C \cdot, \$]]\}$
(3, c)	$\{[C \rightarrow c \cdot C, \$]]\}$	3	
(3, d)	$\{[C \rightarrow d \cdot, \$]]\}$	4	

a) a b b b c c d

State	Action	Goto						
a	b	c	d	\$	S	A	B	C
0	s1							
1			s3 s4					2
2				acc				5
3			s3 s4					5
4								
5								

Trace.

Step	Stack	Input	Action.
1	0	a b b b c c d \$	s1

b) a c c d

Trace tree

Step	Stack	Input	Action
1	0	a c c d \$	s1
2	0 a 1	c c d \$	s3
3	0 a 1 c 3	c d \$	s3
4	0 a 1 c 3 c 3	d \$	s4
5	0 a 1 c 3 c 3 d 4	\$	r7
6	0 a 1 c 3 c 3 C	\$	5
7	0 a 1 c 3 c 3 C 5	\$	r6
8	0 a 1 c 3 C	\$	5
9	0 a 1 c 3 C 5	\$	r6
10	0 a 1 C	\$	2
11	0 a 1 C 2	\$	acc

c) acdbaacd

b c c d d d a c

Trace	tree		
Step	Stack	Input	Action
1	0	acd baa cd\$	S1
2	0a1	cd baa cd\$	S3
3	0a1c3	d baa cd\$	S4
4	0a1c3d4	baa cd\$	

d) acdbbd

Trace	tree		
Step	Stack	Input	Action
1	0	acd bd\$	S1
2	0a1	cd bd\$	S3
3	0a1c3	d bd\$	S4
4	0a1c3d4	bd\$	

e) abcdabad

Trace	tree		
Step	Stack	Input	Action
1	0	abcd abad\$	S1
2	0a1	bcd abad\$	

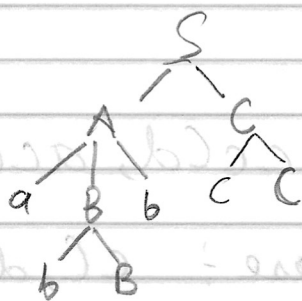
3. 25 points. Given grammar from previous problem. 2 Show parse tree, derivation, handle phrases & simple phrases.

a.  $abBbcc$

Right most derivation :

$$\begin{aligned}
 &S \\
 &AC \\
 &AcC \\
 &abBcC \\
 &abBbccC
 \end{aligned}$$

Parse tree :



Phrases :  $abBbcc$ ,  $abBb$ ,  $cC$ ,  $bB$

Simple phrase :  $bB$ ,  $cC$

Handle :  $bB$

b) accCd

Right most deviation:-  $\underline{S}$

$\underline{AC}$

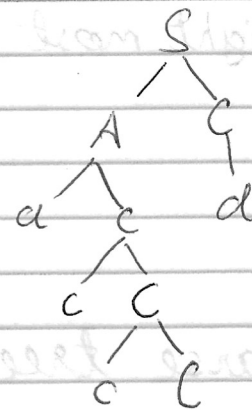
$\underline{Ad}$

$\underline{acd}$

$\underline{acCd}$

$\underline{accCd}$

Deviation/Parse tree:-



Phrase :- accCd, accC, cCc, cC, d

Simple-phrase :- cC, d

Handle - cC

c)  $aCbaacd$  : Not in the language

$\underline{S}$   
 $aC$   
 $aC$   
 $aCd$   
 $\times$

$\underline{S}$   
 $AC$   
 $AC$   
 $ACd$   
 $Aacd$   
 $Aacd$   
 $aBbaacd$   
 $\times$

No other option.

d)  $acdaabd$  : Not in the language

$\underline{S}$   
 $aC$   
 $ad$   
 $\times$

$\underline{S}$   
 $AC$   
 $Ad$   
 $aBbd$   
 $aAabd$   
 $\times \times$

No option for A

e)  $abCbad$  : Not in the language.

$\underline{S}$   
 $aC$   
 $ad$   
 $\times$

$\underline{S}$   
 $AC$   
 $Ad$   
 $Aad$   
 $aBbad$   
 $\times$

No option for B to make  $bC$