

Date: / /

✓

Assignment 2

$$\textcircled{1} \quad S \rightarrow abABC / DE$$

$$A \rightarrow a / \epsilon$$

$$B \rightarrow bA / \epsilon$$

$$C \rightarrow c$$

$$D \rightarrow d / (E)$$

$$E \rightarrow e / \epsilon$$

Follow

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

$\{ b, a, c, \epsilon, \$ \}$

$\{ c, a, b, \epsilon, \$ \}$

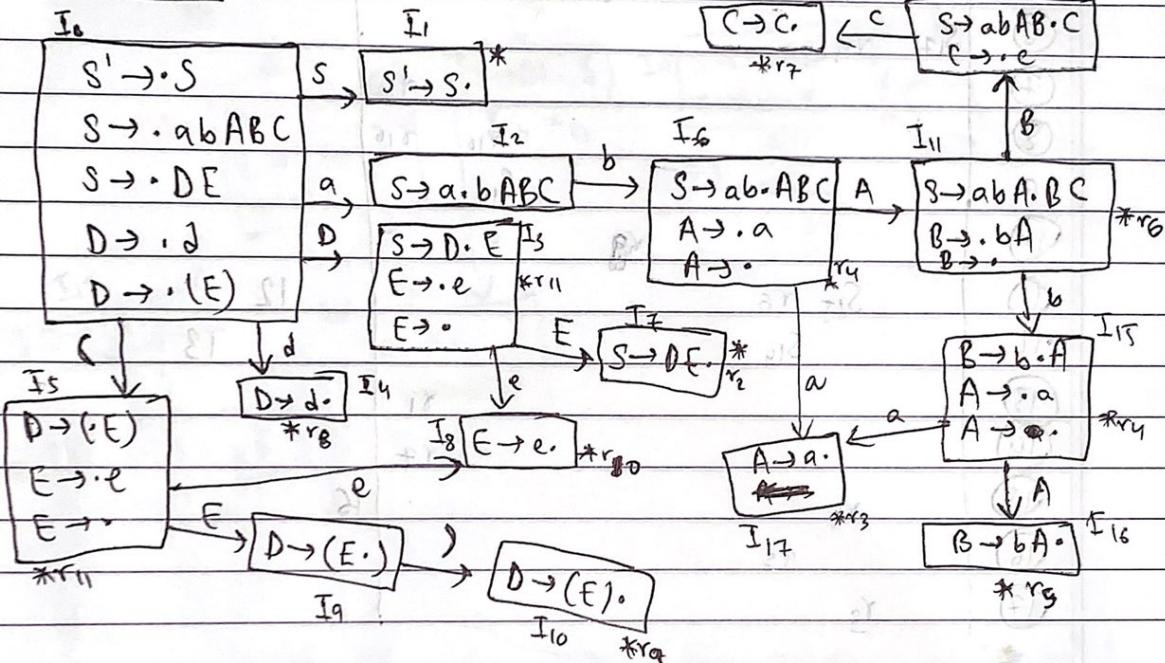
$\{ \epsilon, a, b, c \}$

$\{ e, \epsilon, \$ \}$

$\{ \$, e, a, b, c \}$

*r₁ I₁₃
 $S \rightarrow abABC$

LR(0)



Follow

$S \in \{ \$ \}$

$A \in \{ b \}$

$B \in \{ c \}$

$C \in \{ \$ \}$

$D \in \{ e \}$

$E \in \{ \$, \epsilon \}$

First

$\{ a, d, \epsilon \}$

$\{ a, e \}$

$\{ b, e \}$

$\{ c \}$

$\{ d, \epsilon \}$

$\{ e, \epsilon \}$

Date: / /

807X

LR(0) Parse Table:

	gpto						action					
	a	b	c	d	e	() \$	A	B	C	D	E	S
0	s ₂					s ₄						
1						s ₅						
2												
3												
4	r ₁₁	r ₁₁	r ₁₁	r ₁₁	r ₁₁	r ₁₁ /S ₈	r ₁₁	r ₁₁	r ₁₁			
5	r ₈	r ₈	r ₈	r ₈	r ₈	r ₈	r ₈	r ₈	r ₈			
6	r ₁₁	r ₁₁	r ₁₁	r ₁₁	r ₁₁	r ₁₁ /S ₈	r ₁₁	r ₁₁	r ₁₁			
7	r ₁₂ /r ₆	r ₁₂	r ₁₂	r ₁₂	r ₁₂	r ₁₂	r ₁₂	r ₁₂	r ₁₂			
8	r ₂	r ₂	r ₂	r ₂	r ₂	r ₂	r ₂	r ₂	r ₂			
9	r ₁₀	r ₁₀	r ₁₀	r ₁₀	r ₁₀	r ₁₀	r ₁₀	r ₁₀	r ₁₀			
10	r ₉	r ₉	r ₉	r ₉	r ₉	r ₉	r ₉	r ₉	r ₉			
11	r ₆	r ₆ /S ₁₁	r ₆	r ₆	r ₆	r ₆	r ₆	r ₆	r ₆			
12												
13	r ₁	r ₁	r ₁	r ₁	r ₁	r ₁	r ₁	r ₁	r ₁			
14	r ₇	r ₇	r ₇	r ₇	r ₇	r ₇	r ₇	r ₇	r ₇			
15	r ₄ /r ₂	r ₄	r ₄	r ₄	r ₄	r ₄	r ₄	r ₄	r ₄			
16	r ₅	r ₅	r ₅	r ₅	r ₅	r ₅	r ₅	r ₅	r ₅			
17	r ₃	r ₃	r ₃	r ₃	r ₃	r ₃	r ₃	r ₃	r ₃			

Multiple S-R and R-R conflicts so it is not an LR(0) grammar.

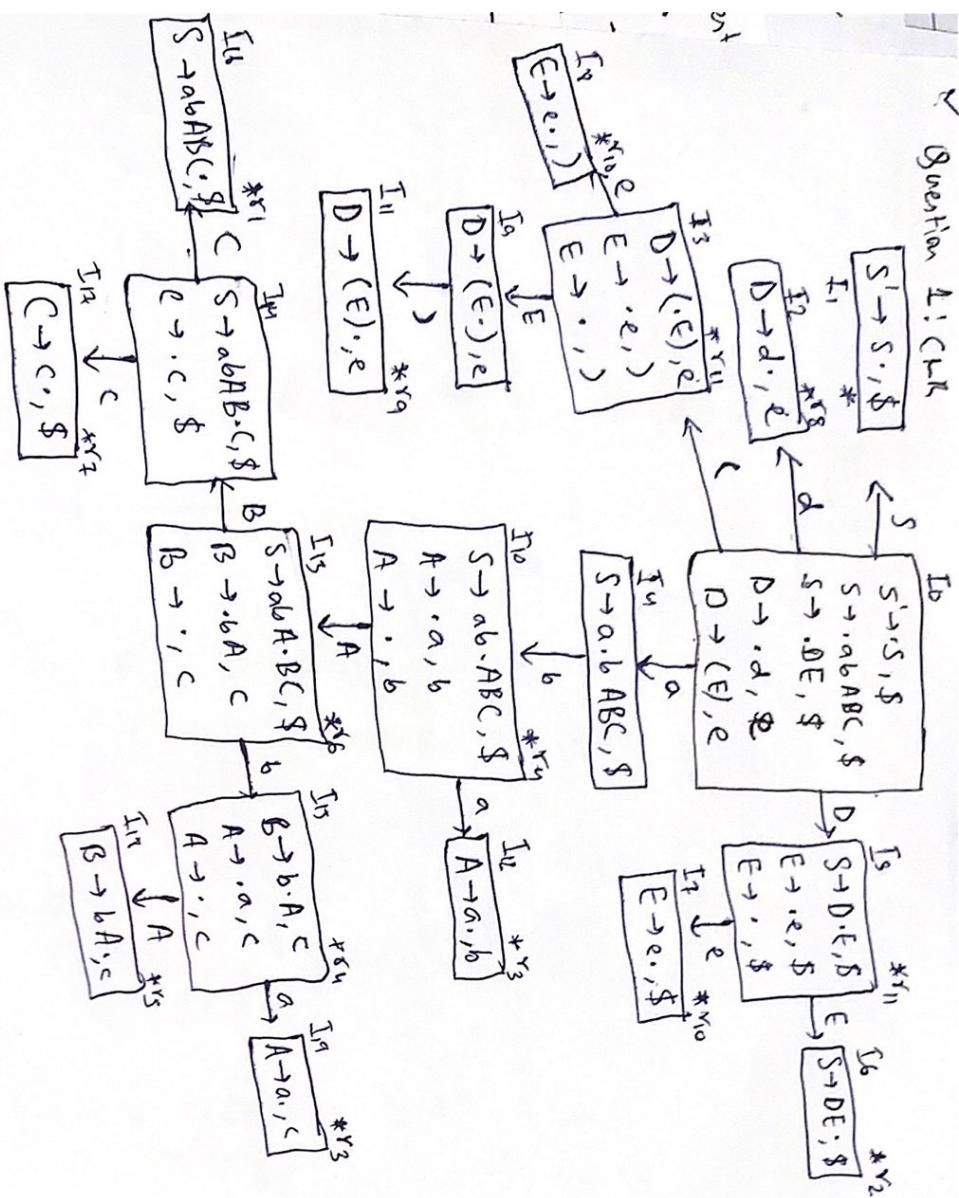
Date: / /

SLR(1) Parse Table

	a	b	c	d	e	()	\$	A	B	C	D	E	S
0	S_2				S_4		S_5						1
1													acc
2					S_6								
3							S_8	r_{11}	r_{11}				
4								r_8					
5									r_{11}	r_{11}			
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													

This grammar is in SLR(1) as there are no S-R or R-R conflicts.

Question 1: CR



Grammars in CLR(1)
since no conflicts

A hand-drawn diagram of a binary tree with 15 nodes labeled r_1 through r_{15} . The root node is r_1 . The tree has three levels:

- Level 1:** Contains nodes r_1 and r_2 .
- Level 2:** Contains nodes r_3, r_4, r_5 , and r_6 . Node r_3 is the left child of r_1 . Node r_4 is the right child of r_1 . Node r_5 is the left child of r_2 . Node r_6 is the right child of r_2 .
- Level 3:** Contains nodes $r_7, r_8, r_9, r_{10}, r_{11}, r_{12}, r_{13}, r_{14}$, and r_{15} . Node r_7 is the left child of r_3 . Node r_8 is the right child of r_3 . Node r_9 is the left child of r_4 . Node r_{10} is the right child of r_4 . Node r_{11} is the left child of r_5 . Node r_{12} is the right child of r_5 . Node r_{13} is the left child of r_6 . Node r_{14} is the right child of r_6 . Node r_{15} is the right child of r_{13} .

1

Question 2

S → abcDE / abAAB

Δ \downarrow

$$\beta \rightarrow \hat{\beta}(b)$$

$$c \rightarrow cDE/\epsilon$$

D
↓
E.

3 → E

Follow

Final Total
1-2 \$53

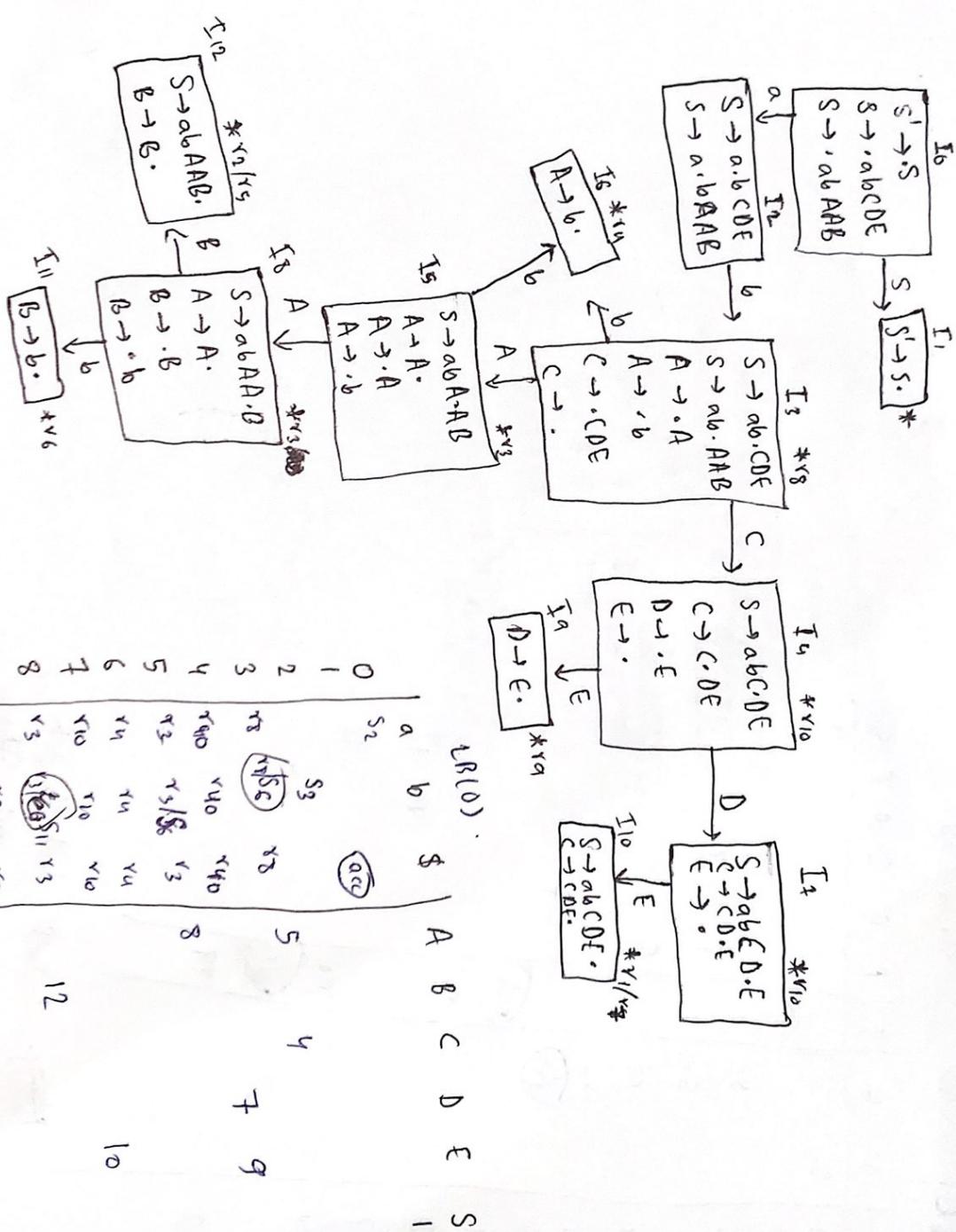
卷之二

卷之三

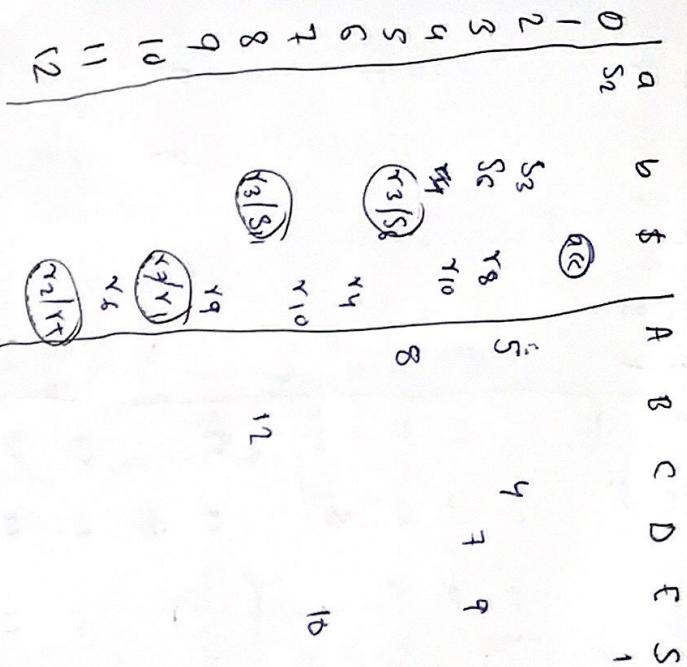
卷之三

۱۰۷

卷三

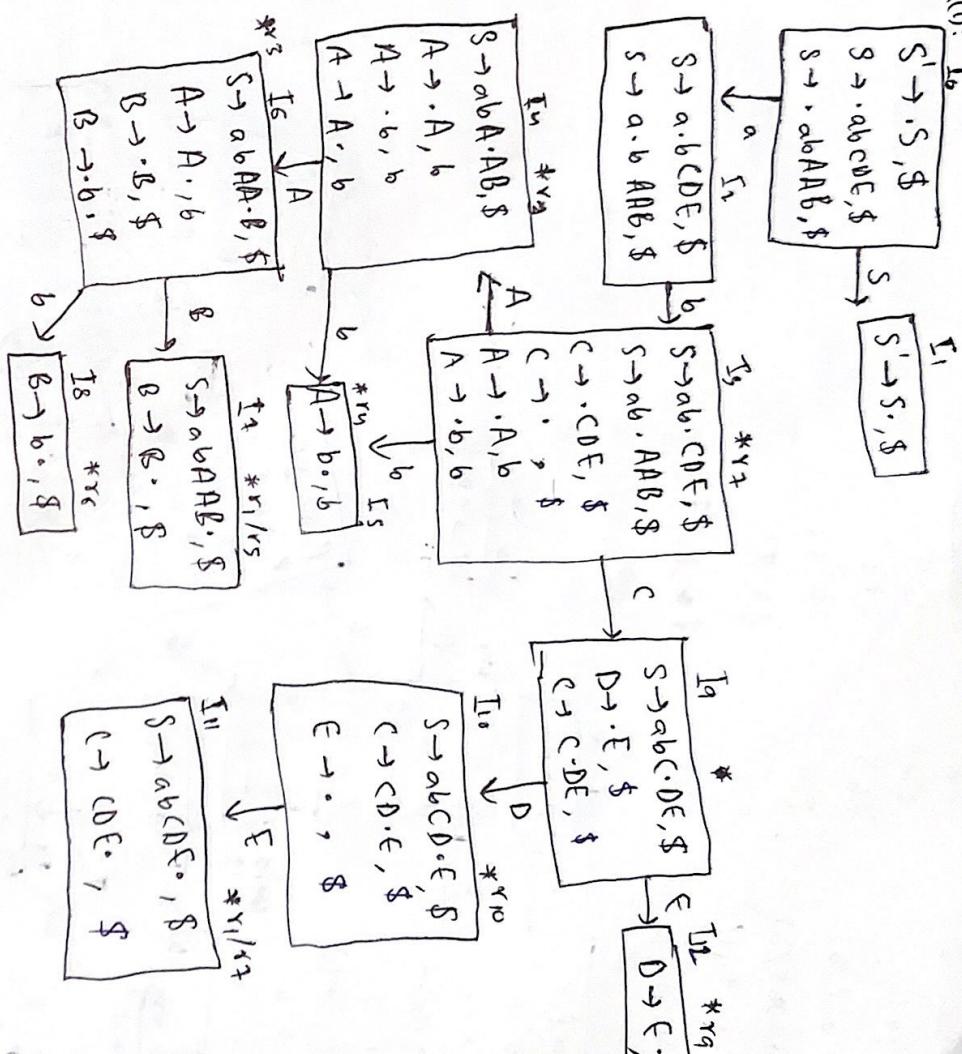


SLR(1) - Q₂



2 SR and 2 R-R
conflict still remain
So not in SLR(1)

CLR(1):



\checkmark ~~LALR(1) - LR2~~ string: ab

	a	b	\$	A	B	C	D	E	S	I
0	s_2									1
1										
2			acl							
3			s_3							
4				r_7						
5					i					
6						q				
7							b			
8								d		
9									f	
10										
11										
12										

Many 2 R-R and 1 S-R
 conflict so not CLR(1)

No same LR(0) items so
 cannot merge so not
 LALR(1) as
 well.

Question - 3

$P \rightarrow S.R/S$

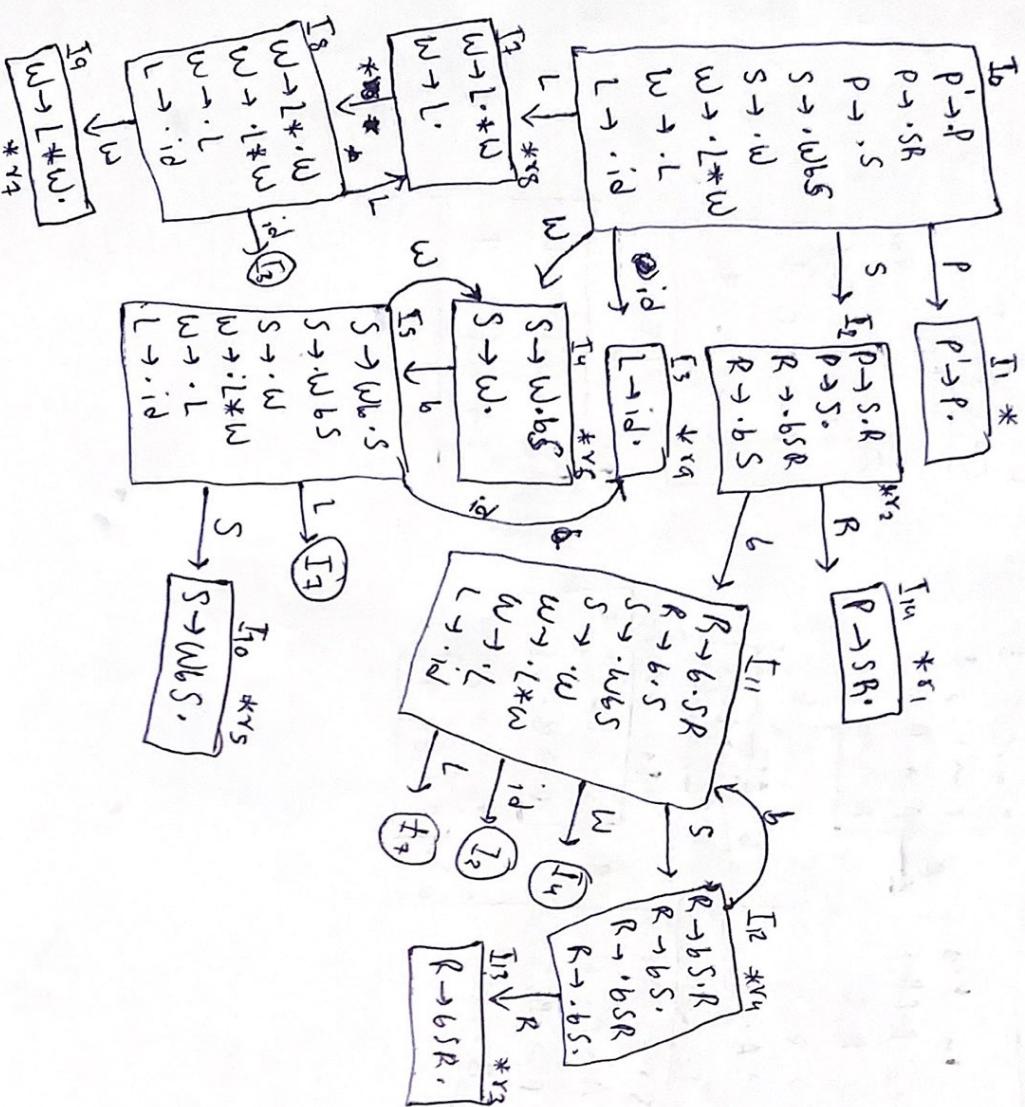
$R \rightarrow b.SR/bS$

$S \rightarrow WS/W$

$W \rightarrow L^*W/L$

$L \rightarrow id^*$

First
 $\{ id \}$
 $\{ \$ \}$
 $\{ b \}$
 $\{ \$ \}$
 $\{ b, \$ \}$
 $\{ id \}$
 $\{ \$ \}$
 $\{ *, b, \$ \}$



LR(0)

	0	1	2	3	4	5	6	*
P	✓							

	0	1	2	3	4	5	6	*
S	✓							

	0	1	2	3	4	5	6	*
R	✓							

	0	1	2	3	4	5	6	*
W	✓							

	0	1	2	3	4	5	6	*
L	✓							

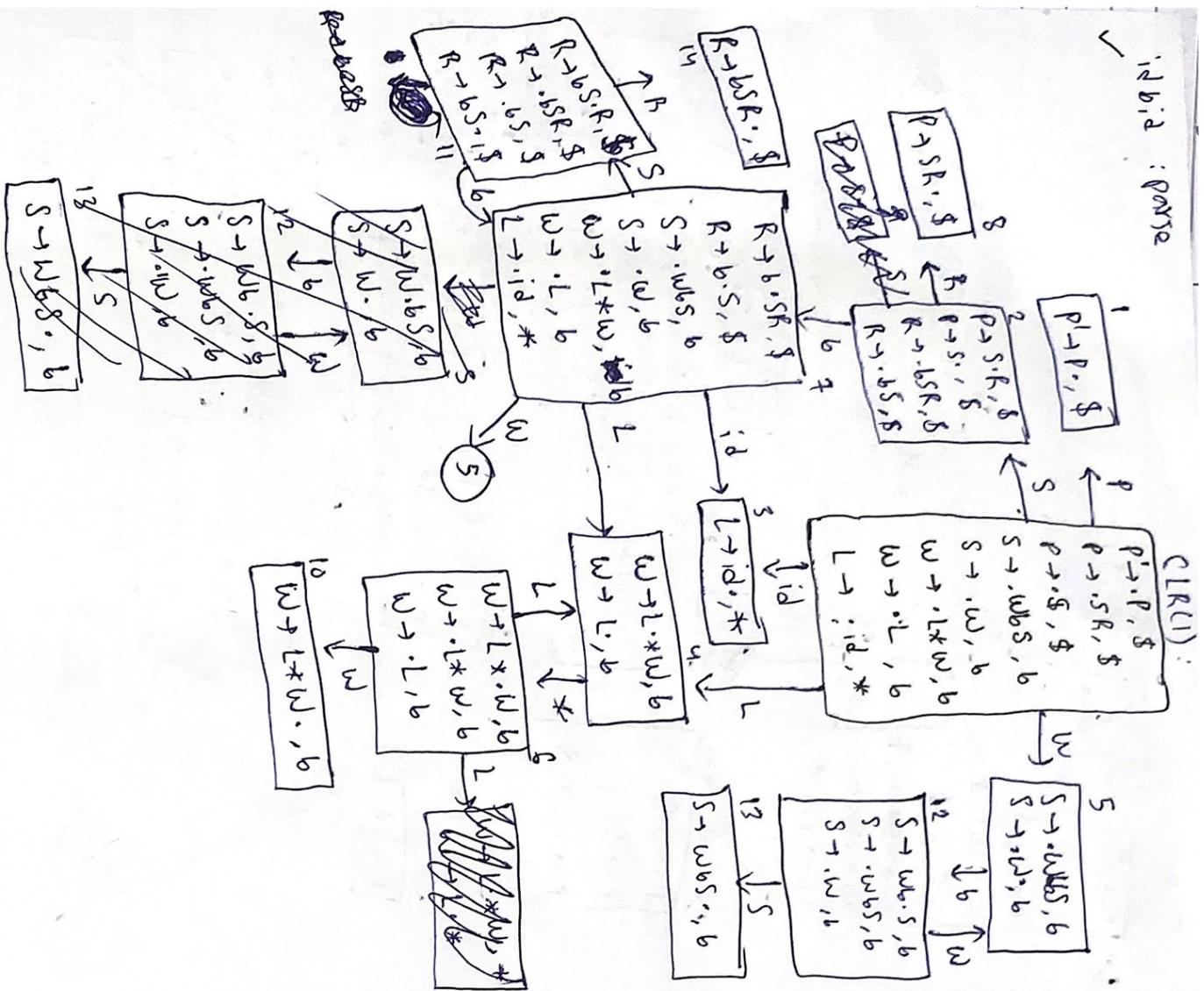
4 S-R conflicts so not in LR(0) X

LR(0) X
 SLR(1) ✓
 LALR(1) ✓
 CLR(1) ✓

SLR(1) - Q3

	b	*	id	\$	P	S	R	W	L
0					1	2		4	7
1									
2	S ₁₁			r ₂			14		
3	r ₉	r ₉		r ₉					
4	(S ₅ /r ₆)			r ₆					
5			S ₃		10			4	7
6									
7	r ₈	S ₈		r ₈					
8			S ₃					9	7
9	r ₇			r ₇					
10	r ₅			r ₅	12			4	7
11			S ₃					13	
12	S ₁₁			r ₄					
13				r ₃					

Not in SLR(1) because $\not\in S-R$
conflict.

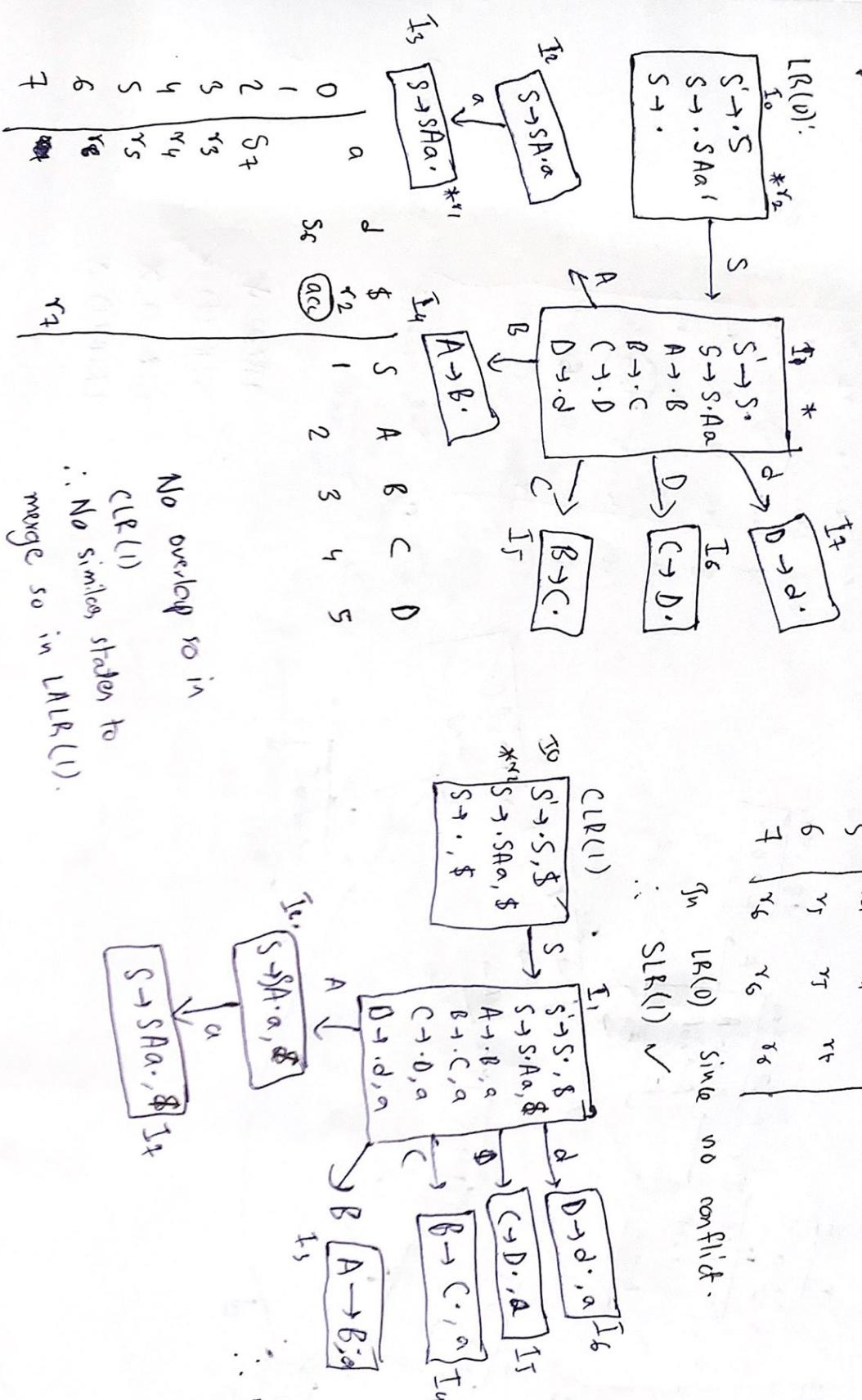


Same. Not CLR(1) became S-R conflict.

No same station so cannot merge so
not in LARL(1) too.

Ques - 4

full
follow

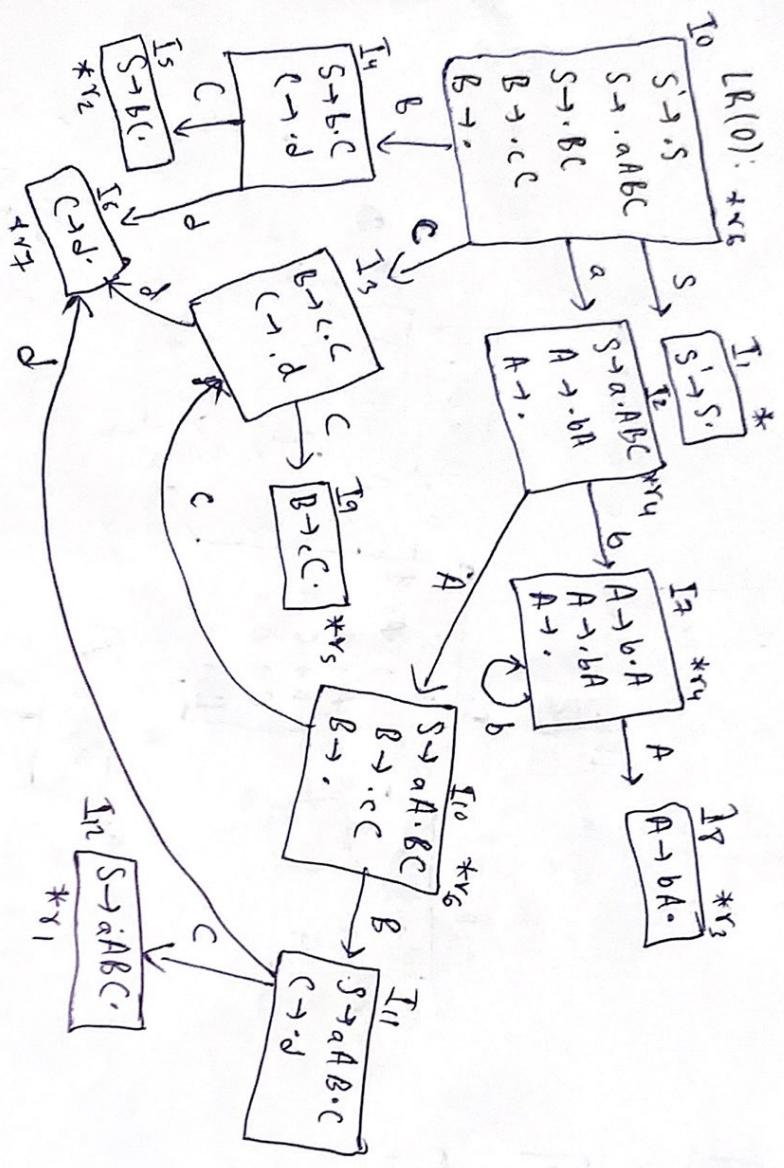


LA(0) ✓
SLR(0) ✓
LAR(1) ✓
CLR(1) ✓

Question 5

follows

$$\begin{array}{l}
 S \rightarrow aABC \\
 S \rightarrow BC \\
 A \rightarrow bA \\
 B \rightarrow cC \\
 C \rightarrow d \\
 \vdash a, c, d
 \end{array}$$



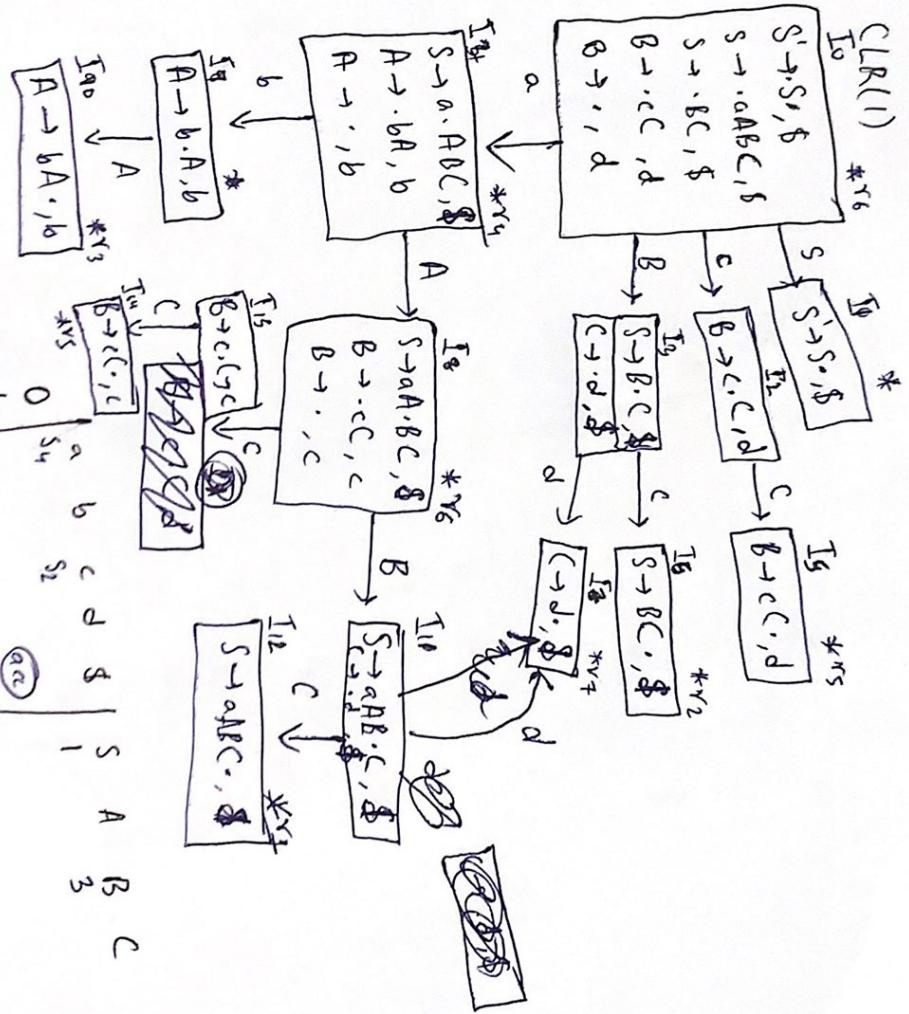
S-R conflicts :: not in LR(0)

L8(0) X
SLR(1) ✓
CLR(0) X
LARR(1) X

Question-5 SLR(1)

No S-R conflict

\therefore not in SLR(1).



S-R conflict so

not in CLK(1)

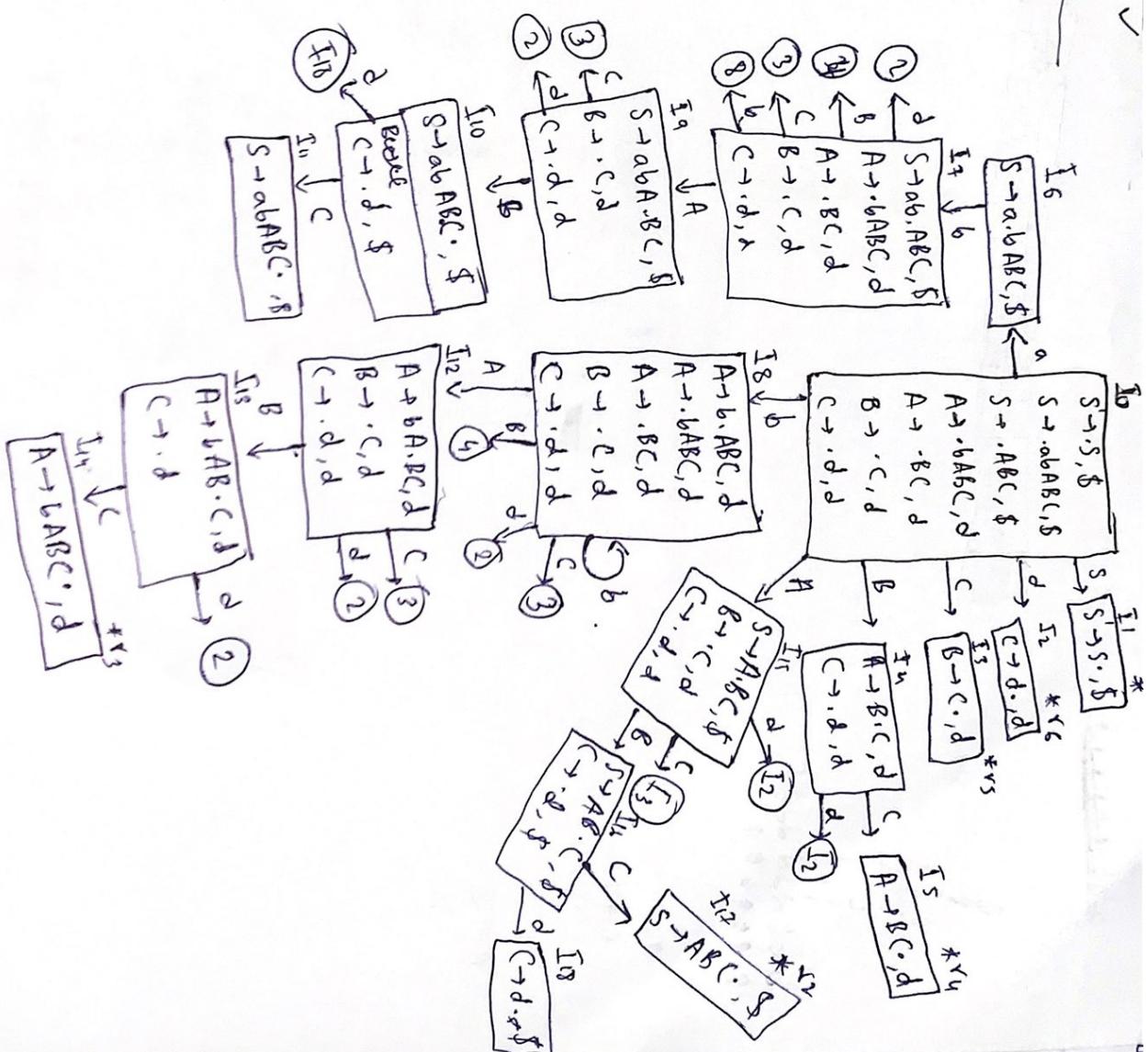
विद्यालय

not in LAR(1)

12

	a	b	d	S	A	B	C	S	v
0	s ₆	s ₈	s ₂	s ₅	15	4	3	1	
1	r ₂				r ₆	r ₅	r ₄	r ₃	
2		r ₂			r ₆	r ₅	r ₄	r ₃	
3			r ₂		r ₅	r ₄	r ₃	r ₂	
4				r ₂	r ₄	r ₃	r ₂	r ₁	
5					9	4	3		
6					12	4	3		
7					10	3			
8					11				
9									
10									
11									
12									
13									
14									
15									
16									
17									

∴ No conflict so LR(0) ✓
SLR(1) ✓



: CLR(1)

CLR(1)				A	B	C	S	
0	a	b	d	\$	15	4	3	1
1	S ₆	S ₈	S ₂					
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

No S-R conflict \therefore in CLR(1)

Only In and ItS have same LR(0) item.
So LALR(1)!

LALR(1)				A	B	C	S	
0	a	b	d	\$	15	4	3	1
1	S ₆	S ₈	S ₂					
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								

Total state # = 17 same like SLR(1) + no conflict
So grammar is LALR(1).