① A → BA / ε

First (B) = $\{a, b\}$

B → aB / b

First (A) = $\{a, b, \varepsilon\}$

CLR Parser for A→BA/ε ; B→aB/b : G

$G' = A' \rightarrow A$; A → BA ; A→ε ; B→aB ; B→b

$G' = A' \rightarrow A$; A→BA ; A→ε ; B→aB ; B→b

$I_0 = (A, B, a, b)$

$I_1 = $ goto $(I_0, A) = $ closure $(A' \rightarrow A, \$) = \{A' \rightarrow A; \$\}$

$I_2 = $ goto $(I_0, B) = $ closure $(A \rightarrow B \cdot A, \$) = \{(A \rightarrow B \cdot A, \$)$,

$(A \rightarrow BA, \$)$, $(A \rightarrow \$)$, $(B \rightarrow aB,$
$a / b / \$)$
$(B \rightarrow b, a / b / \$)\}$

$I_3 = $ goto $(I_0, a) = $ closure $(B \rightarrow a \cdot B, a / b / \$)$

$= \{(B \rightarrow a \cdot B, a / b / \$), B \rightarrow a \cdot B a / b / \$), (B \rightarrow$
$b, a / b / \$)\}$

$I_4 =$ goto $(I_0, b) =$ closure $(B \to b \cdot a/b/\$)$

$\qquad = \{B \to b, a/b/\$)\}$

$I_2 \; ; \; I_2 \; (A, B, a, b)$

$I_5 =$ goto $(I_2, A) =$ closure $(A \to BA \cdot \$) = \{A \to BA, \$\}$

goto $(I_2, B) =$ closure $(A \to B.A, \$) = I_2$

goto $(I_2, a) =$ closure $(B \to aB, a/b/\$) = I_3$

goto $(I_2, b) = I_4$

$I_3 \; (B, a, b)$

$I_6 =$ goto $(I_3, B) =$ closure $(B \to aB \cdot, a/b/\$)$

$\qquad\qquad = \{(B \to aB, a/b/\$)\}$

goto $(I_3, a) = I_3$, goto $(I_3, b) = I_4$

$I_4 \; ; \; I_5 \; ; \; I_6$

State	a	b	\$		A	B
0	S_3	S_4	S_2		1	2
1			accept			
2	S_3	S_4	R_2		5	2
3	S_3	S_4				6
4	R_4	R_4	R_4			
5		●	R_1			
6	R_3	R_3	R_3			

$G =$ 1) $A \to BA$

2) $A \to \varepsilon$

3) $B \to aB$

4) $B \to b$.

2) G: 1) $S \to L=R$ 2) $S \to R$ 3) $L \to a$ 4) $L \to R$
   5) $R \to L$

$G^1 = S^1 \to S$; $S \to L = R/R$; $L \to a/*R$; $R \to L$

I_0 = closure $(S^1 \to S, \$) = \{(S^1 \to S\$), (S \to L=R, \$)$

$(S \to R\$), (R \to L, \$), (L \to R\$)(L \to *R\$),$

$(L \to a, \$)\}$;

I_0 $(S, L, R, *, a)$

$I_1 = $ goto (I_0, S)
   = Closure $(S \to S, \$) \neq \{(S^1 \to S.\$)\}$

I_2 = goto $(I_0, L) = $ closure $(S \to L=R\$) \cup$
                                  closure $(R \to L.\$)$

$= \{(S \to L.=R, \$), (R \to L.\$)\}$

$I_3 = $ goto $(I_0, R) = $ closure $(S \to R; \$) = \{(S \to R, \$)\}$

$I_4 = $ goto $(I_0, *) = $ closure $(L \to *R, \$)$

$\neq \{(L \to R, \$, *), (R \to L, \$1=),$

$(L \to *, \$1=), (L \to a, \$1=a)\}$

$I_5 = $ goto $(I_0, a) = $ closure $(L \to a, \$/a) = \{(L \to a, \$1=)\}$

   $I_1; I_2 (=);$

$I_6 = $ goto $(I_2, =) = $ closure $(S \to L, R, \$)$
      $= \{(S \to L = R, \$), (R \to L, \$), (L \to R\$), (L \to a, b)\}$

$I_3 ; I_4$ $(R, L, *, a)$

$I_7 = $ goto $(I_4, R) = $ closure $(L \rightarrow R; \$ \ 1 =)$

$\qquad = \{ (L \rightarrow R, \$ \ L =) \}$

$I_8 = $ goto $(I_4, L) = $ closure $(R \rightarrow L; \$ 1 =)$

$\qquad = \{ (R \rightarrow L, \$ 1 =) \}$

$\qquad$ goto $(I_4, *) = I_4 ; $ get $(I_4, a) = I_6$

$\qquad I_5 ; I_6 \quad (R, L, *, a)$

$I_9 = $ goto $(I_6, R) = $ closure $(S \rightarrow L = R; \$)$

$\qquad = \{ (S \rightarrow L = R, \$) \}$

$I_{10} = $ goto $(I_6, L) = $ closure $(R \rightarrow L; \$) = \{ (R \rightarrow L \cdot \$) \}$

$I_{11} = $ goto $(I_6, *) = $ closure $(L \rightarrow *R, \$) = \{ L \rightarrow * \cdot R, \$ \} \}$

$I_{12} = $ goto $(I_6, a) = $ closure $(L \rightarrow a, \$) = \{ (L \rightarrow a \cdot \$) \}$

$\qquad I_7 ; I_8 ; I_9 ; I_{10} ; I_{11} \ (R)$

$I_{13} = $ goto $(I_{11}, R) = $ closure $(L \rightarrow *R, \$) = \{ (L \rightarrow R, \$$

$\qquad I_{12} ; I_{13}$

CLR Parsing table :-

state	a	*	=	$	S	L	R
0	S_5	S_4			1	2	3
1				accept			
2			S_6	R_5			
3				R_2			
4	S_5	S_4				8	7
5			R_3	R_3			
6	S_{12}	S_{11}				10	9
7			R_4	R_4			
8			R_5	R_5			
9				R_1			
10				R_5			
11							13
12				R_3			
13				R_4			

③ LALR for G : 1) $S \rightarrow Aa$ 2) $S \rightarrow bAC$ 3) $S \rightarrow BC$

　　　　4) $S \rightarrow bBA$ 5) $A \rightarrow d$ 6) $B \rightarrow d$

$G' = S' \rightarrow S$; $S \rightarrow a\ Aa/b\ AC/BC/bBC$; $A \rightarrow d$; $B \rightarrow d$

$I_0 = $ closure $(S' \rightarrow S, \$) = \{(S' \rightarrow S, \$), (S \rightarrow Aa, b),$

$(S \rightarrow bAC, \$), (S \rightarrow BC, \$), (S \rightarrow bBa, b),$

$(A \rightarrow d, a), (B \rightarrow d, c)\}$

First $(A) = $ First$(B) = \{d\}$; First $(S) = \{d, b\}$

$I_0 \{S, A, B, b, d\}$

$I_1 = $ goto $(I_0, S) = $ closure $(S' \rightarrow S, \$) = \{S' \rightarrow S, \$\}$

$I_2 = $ goto $(I_0, A) = $ closure $(S' \rightarrow A \cdot a, \$) = \{S \rightarrow A \cdot a, \$\}$

$I_3 = $ goto $(I_0, B) = $ closure $(S \rightarrow B \cdot C, \$) = \{(S \rightarrow BC, \$)\}$

$I_4 = $ goto $(I_0, b) = $ closure $(S \rightarrow b \cdot AC, \$) \cup$

　　　　　　　closure $(S \rightarrow b \cdot Ba, \$)$

$= \{(S \rightarrow bAC, \$), (S \rightarrow b \cdot Ba, \$)$

　　　　$, (A \rightarrow d, c), (B \rightarrow d, a)\}$

$I_5 = $ goto $(I_0, d) = $ closure $(A \rightarrow d, a) \cup$ closure $(B \rightarrow d \cdot c)$

$= \{(A \rightarrow d \cdot a), (B \rightarrow d \cdot c)\}$

$I_1 ; I_2 ; I_3$

I_4 (A, B, d)

$I_6 =$ goto $(I_4, A) =$ closure $(S \rightarrow b.A, C, \$)$

$\qquad = \{ (S \rightarrow bA \cdot C, \$) \}$

$I_7 =$ goto $(I_4, B) =$ closure $(S \rightarrow bBa, \$)$

$\qquad = \{ (S \rightarrow bB, \$) \}$

$I_8 =$ goto (I_4, d)

$\qquad =$ closure $(A \rightarrow d, c) \cup$ closure $(B \rightarrow d, a)$

$\qquad = \{ (A \rightarrow d, c), (B \rightarrow d, a) \}$

Combine I_5, I_8 to I_{58}

$I_{58} = \{ (A * d.a /c), (B \rightarrow d, a/c) \}$

I_5, I_6, I_{58}

$G = 1) \ S \rightarrow Aa \quad 2) \ S \rightarrow bAC \quad 3) \ S \rightarrow BC$

$\qquad 4) \ S \rightarrow bBA \quad 5) \ A \rightarrow d \quad 6) \ B \rightarrow d$

$I_6 (C);$

$I_8 =$ goto $(I_6, C) =$ closure $(S \rightarrow bAC \cdot \$) =$

$\qquad\qquad\qquad\qquad \{ (S \rightarrow bAC, \$) \}$

$I_7 (a);$

$I_{10} =$ goto $(I_7, a) =$ closure $(S \rightarrow bBa, \$)$

$\qquad\qquad\qquad = \{ (S \rightarrow baa; \$) \}$

$\qquad\qquad I_9, I_{10};$