COMPILER DESIGN

ASSIGNMENT NO. 1.

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Ans 1 = Calculate first & follow :

Grammar	first	follow
$E \rightarrow TE$	{(, id}	{$}
$E' \rightarrow +TE' / \epsilon$	{+, ε}	{$}
$T \rightarrow FT'$	{(, id}	{+, $}
$T' \rightarrow *FT' / \varepsilon$	{*, ε}	{+, $}
$F \rightarrow (\epsilon) / id$	{(, id}	{*, +, $}

Ans. 2 Predictive Parsing Table.

	(	)	*	+	id	$
$E \rightarrow TE'$	$E \rightarrow TE'$				$E \rightarrow T\varepsilon'$	
$E' \rightarrow +TE' / E$				$E' \rightarrow +TE'$		$\varepsilon' \rightarrow \varepsilon$
$T \rightarrow FT$	$T \rightarrow FT'$				$T' \rightarrow FT'$	
$T' \rightarrow FT' / E$			$T' \rightarrow FT$	$T' \rightarrow E$		$T' \rightarrow E$
	$F \rightarrow (E)$				$F \rightarrow id$	

Ans 3 Leftmost & Rightmost derivation.

String : a + b * a + b

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Leftmost derivation

E

E+E

a+E

a+E*E

a+b*E

a+b*E+E

a+b*a+E

a+b*a+b

$E \to E+E$

$E \to a$

$E \to E*E$

$E \to b$

$E \to E+E$

$E \to a$

$E \to b$.

Rightmost Derivation.

E

E+E

E+b

E*E+b.

E*a+b.

E+E*a+b

E+b*a+b

a+b*a+b.

$E \to E+E$

$E \to b$

$E \to E*E$

$E \to a$

$E \to E+E$

$E \to b$

$E \to ba$.

Answer 4 Given grammer:

$E \to E+T/T$

$T \to T*F/F$.

$F \to a/b$.

Follow	
{+, $}	E [r1, r2]
{*, a, $}	T [r3, r4]
{*, +, $}	F [r5, r6]

$\Rightarrow E' \to .E$

$E \to .E + T/.T$

$T \to .T*F/.F$

$F \to .a/.b$

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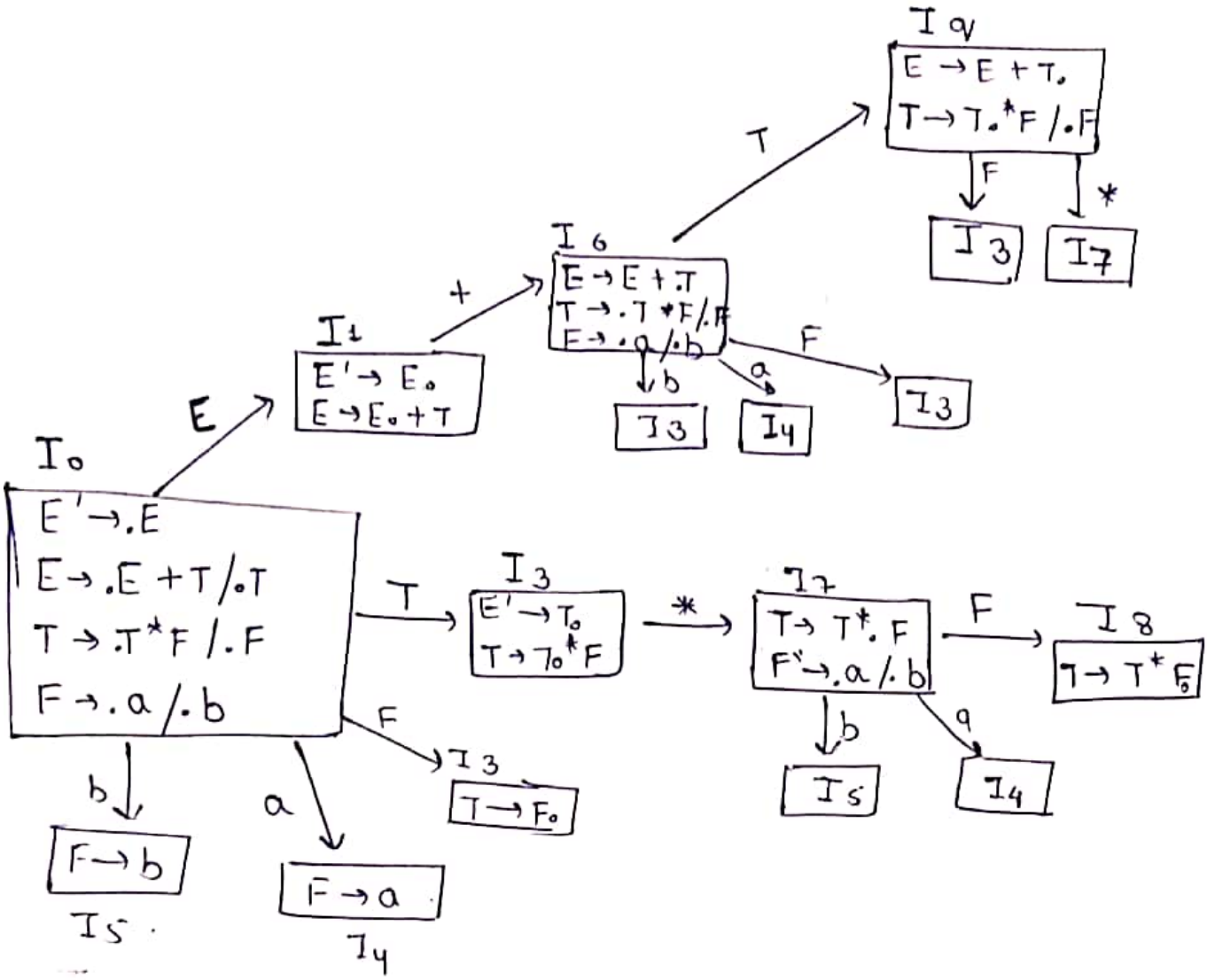

★ Parsing Table.

State	+	*	a	b	$	E	T	F
0			S_4	S_5		1	2	3
1	S_6				Accept			
2	r_2				r_2			
3	r_4				r_4			
4	r_5				r_5			
5	r_6				r_6			
6			S_4	S_5			9	3
7			S_4	S_5				8
8	r_3	r_3			r_3			3
9	r_1	S_7			r_1			

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★ Parsing the Given String

Parsing Stack	Input	Action
$0	a * b + a $	Shift 4
$0 a 4	* b + a $	Reduce 5
$ 0 F 3	* b + a $	Reduce 4
$ 0 T 2	* b + a $	Shift 7
$ 0 T 2 * 7	b + a $	Shift 5
$ 0 T 2 * 7 b 5	+ a $	Reduce 6
$ 0 T 2 * 7 F 8	+ a $	Reduce 3
$ 0 T 2	+ a $	Reduce 2
$ 0 E 1	+ a $	Shift 6
$ 0 E 1 + 6	a $	Shift 4
$ 0 E 1 + 6 a 4	$	Reduce 5
$ 0 E 1 + 6 F 3	$	Reduce 4
$ 0 E 1 + 6 T 9	$	Reduce 1
$ 0 E 1 .	$	Accept .

Ans. 5'

$S \rightarrow Aa$
$S \rightarrow bAc$
$S \rightarrow dc$
$S \rightarrow bda$
$S \rightarrow d.$

$\Rightarrow$ $S \rightarrow .Aa$ $\quad S' \rightarrow .S$
$S \rightarrow .bAc$
$S \rightarrow .dc$
$S \rightarrow .bda$
$A \rightarrow .d$

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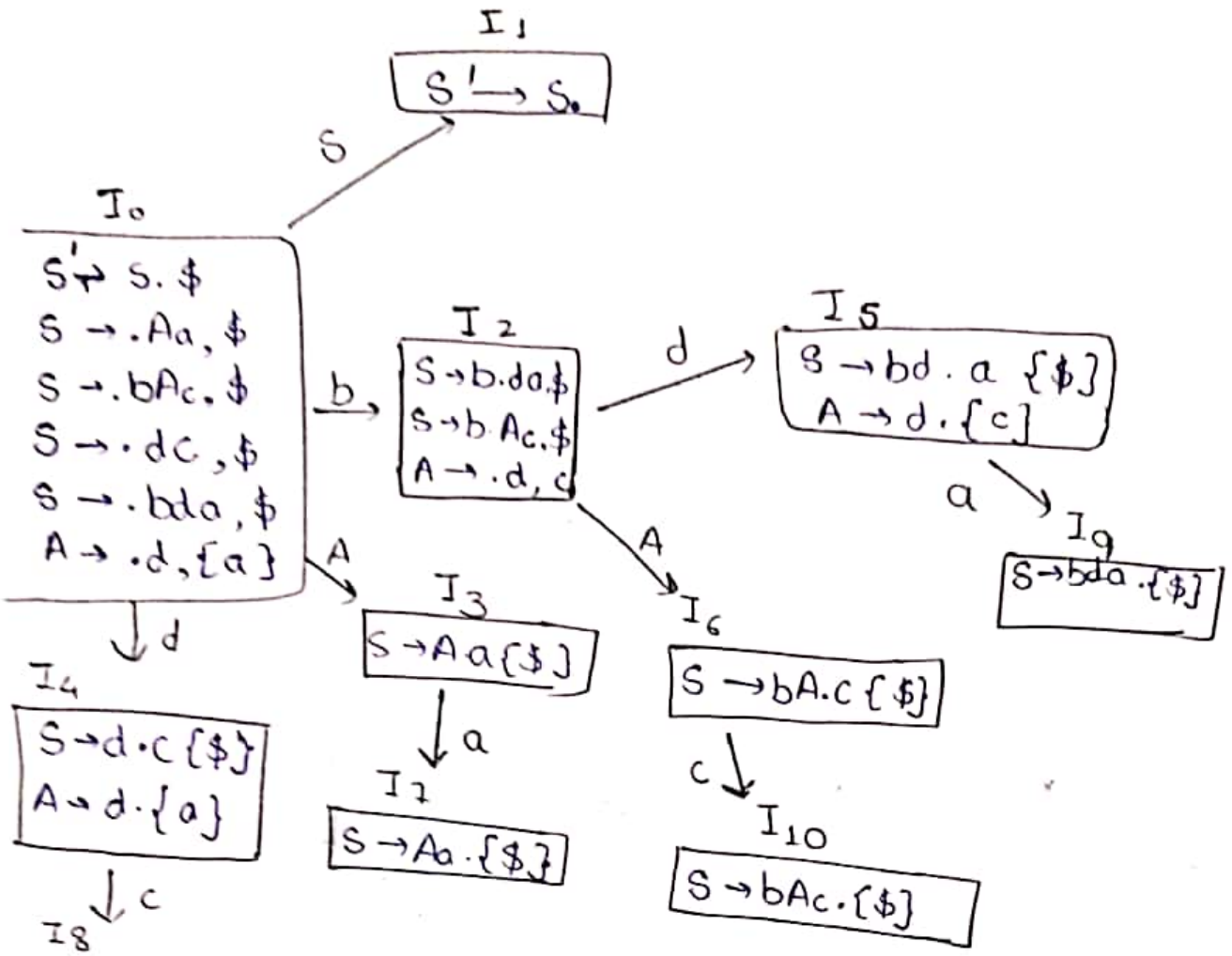

LALR Parsing Table

State	a	b	c	d	$	S	A
0		S_2		S_4		1	3
1					accept		
2				S_5			6
3	S_7						
4	r_6		S_8				
5	S_9		r_5				
6			S_{10}				
7					r_1		
8					r_3		
9					r_4		
10					r_2		

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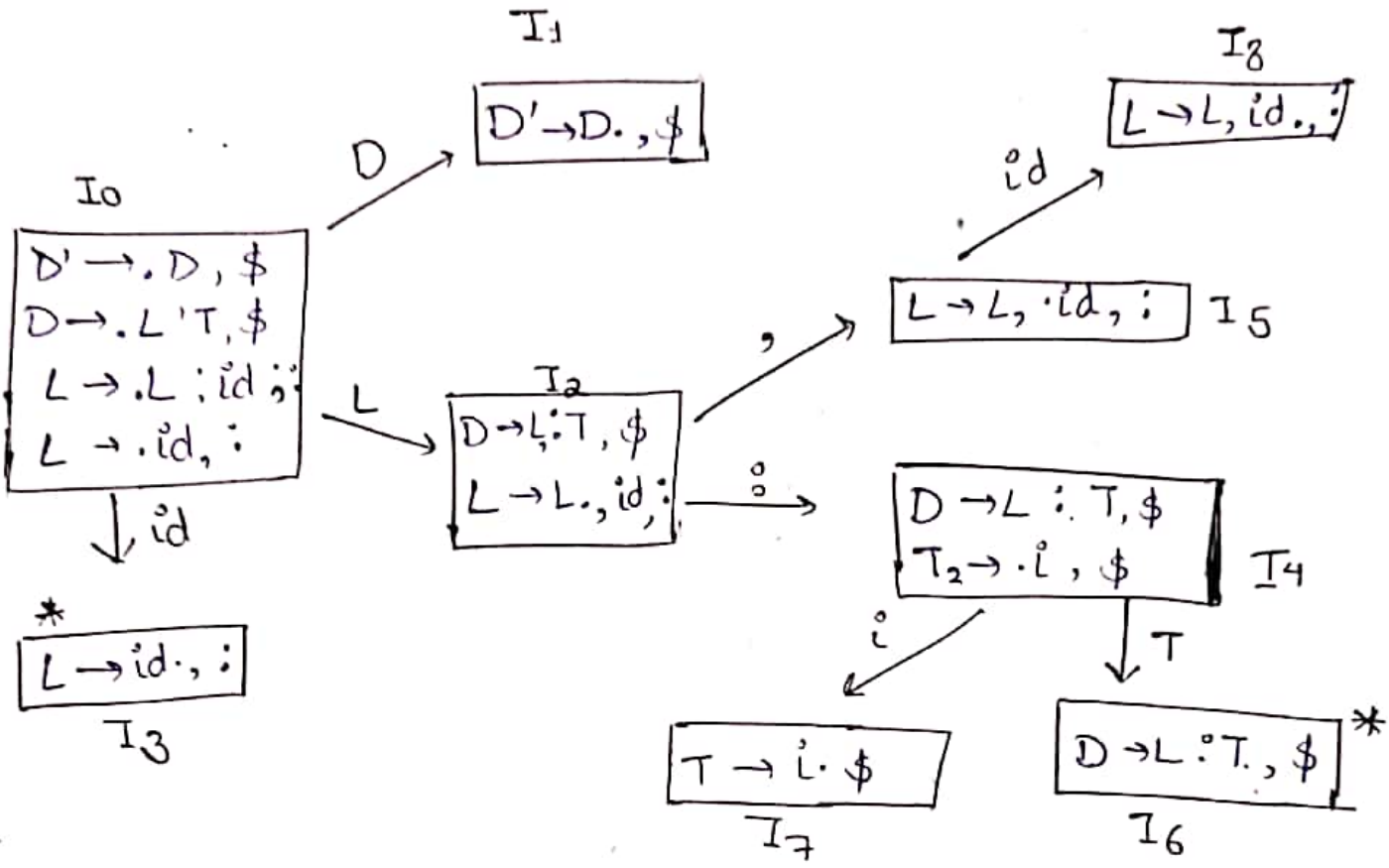
Answer 6:-

A - $D \rightarrow L : T$ ①

$L \rightarrow L , id$ / id ② ③

$T \rightarrow i$ ④

($i \rightarrow$ Integer)



These are the LR(1) Items.

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