LR(1) grammar ('' is ε):

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(0) S' -> S
(1) S -> a S b S
(2) S -> b S a S
(3) S -> ''
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>>

FIRST table	
Nonterminal	**FIRST**
S'	{a,b,''}
S	{a,b,''}

LR(1) closure table

Goto	Kernel	State	Closure
	{[S' -> .S, $]}	0	{[S' -> .S, $]; [S -> .a S b S, $]; [S -> .b S a S, $]; [S -> ., $]}
goto(0, S)	{[S' -> S., $]}	1	{[S' -> S., $]}
goto(0, a)	{[S -> a.S b S, $]}	2	{[S -> a.S b S, $]; [S -> .a S b S, b]; [S -> .b S a S, b]; [S -> ., b]}
goto(0, b)	{[S -> b.S a S, $]}	3	{[S -> b.S a S, $]; [S -> .a S b S, a]; [S -> .b S a S, a]; [S -> ., a]}
goto(2, S)	{[S -> a S.b S, $]}	4	{[S -> a S.b S, $]}
goto(2, a)	{[S -> a.S b S, b]}	5	{[S -> a.S b S, b]; [S -> .a S b S, b]; [S -> .b S a S, b]; [S -> ., b]}
goto(2, b)	{[S -> b.S a S, b]}	6	{[S -> b.S a S, b]; [S -> .a S b S, a]; [S -> .b S a S, a]; [S -> ., a]}
goto(3, S)	{[S -> b S.a S, $]}	7	{[S -> b S.a S, $]}
goto(3, a)	{[S -> a.S b S, a]}	8	{[S -> a.S b S, a]; [S -> .a S b S, b]; [S -> .b S a S, b]; [S -> ., b]}
goto(3, b)	{[S -> b.S a S, a]}	9	{[S -> b.S a S, a]; [S -> .a S b S, a]; [S -> .b S a S, a]; [S -> ., a]}
goto(4, b)	{[S -> a S b.S, $]}	10	{[S -> a S b.S, $]; [S -> .a S b S, $]; [S -> .b S a S, $]; [S -> ., $]}
goto(5, S)	{[S -> a S.b S, b]}	11	{[S -> a S.b S, b]}
goto(5, a)	{[S -> a.S b S, b]}	5	
goto(5, b)	{[S -> b.S a S, b]}	6	
goto(6, S)	{[S -> b S.a S, b]}	12	{[S -> b S.a S, b]}
goto(6, a)	{[S -> a.S b S, a]}	8	
goto(6, b)	{[S -> b.S a S, a]}	9	
goto(7, a)	{[S -> b S a.S, $]}	13	{[S -> b S a.S, $]; [S -> .a S b S, $]; [S -> .b S a S, $]; [S -> ., $]}
goto(8, S)	{[S -> a S.b S, a]}	14	{[S -> a S.b S, a]}
goto(8, a)	{[S -> a.S b S, b]}	5	
goto(8, b)	{[S -> b.S a S, b]}	6	
goto(9, S)	{[S -> b S.a S, a]}	15	{[S -> b S.a S, a]}
goto(9, a)	{[S -> a.S b S, a]}	8	
goto(9, b)	{[S -> b.S a S, a]}	9	
goto(10, S)	{[S -> a S b S., $]}	16	{[S -> a S b S., $]}
goto(10, a)	{[S -> a.S b S, $]}	2	
goto(10, b)	{[S -> b.S a S, $]}	3	
goto(11, b)	{[S -> a S b.S, b]}	17	{[S -> a S b.S, b]; [S -> .a S b S, b]; [S -> .b S a S, b]; [S -> ., b]}
goto(12, a)	{[S -> b S a.S, b]}	18	{[S -> b S a.S, b]; [S -> .a S b S, b]; [S -> .b S a S, b]; [S -> ., b]}
goto(13, S)	{[S -> b S a S., $]}	19	{[S -> b S a S., $]}
goto(13, a)	{[S -> a.S b S, $]}	2	
goto(13, b)	{[S -> b.S a S, $]}	3	
goto(14, b)	{[S -> a S b.S, a]}	20	{[S -> a S b.S, a]; [S -> .a S b S, a]; [S -> .b S a S, a]; [S -> ., a]}
goto(15, a)	{[S -> b S a.S, a]}	21	{[S -> b S a.S, a]; [S -> .a S b S, a]; [S -> .b S a S, a]; [S -> ., a]}
goto(17, S)	{[S -> a S b S., b]}	22	{[S -> a S b S., b]}
goto(17, a)	{[S -> a.S b S, b]}	5	

LR(1) closure table			
Goto	**Kernel**	**State**	**Closure**
goto(17, b)	{[S -> b.S a S, b]}	6	
goto(18, S)	{[S -> b S a S., b]}	23	{[S -> b S a S., b]}
goto(18, a)	{[S -> a.S b S, b]}	5	
goto(18, b)	{[S -> b.S a S, b]}	6	
goto(20, S)	{[S -> a S b S., a]}	24	{[S -> a S b S., a]}
goto(20, a)	{[S -> a.S b S, a]}	8	
goto(20, b)	{[S -> b.S a S, a]}	9	
goto(21, S)	{[S -> b S a S., a]}	25	{[S -> b S a S., a]}
goto(21, a)	{[S -> a.S b S, a]}	8	
goto(21, b)	{[S -> b.S a S, a]}	9	

LR table					
State	**ACTION**			**GOTO**	
	a	**b**	**$**	**S'**	**S**
0	s2	s3	r_3		1
1			acc		
2	s5	◉ s6 / ○ r_3			4
3	◉ s8 / ○ r_3	s9			7
4		s10			
5	s5	◉ s6 / ○ r_3			11
6	◉ s8 / ○ r_3	s9			12
7	s13				
8	s5	◉ s6 / ○ r_3			14
9	◉ s8 / ○ r_3	s9			15
10	s2	s3	r_3		16
11		s17			
12	s18				
13	s2	s3	r_3		19
14		s20			
15	s21				
16			r_1		
17	s5	◉ s6 / ○ r_3			22

Input (tokens): a b b a

Maximum number of steps: 100

PARSE

Trace				Tree
Step	**Stack**	**Input**	**Action**	
1	0	a b b a $	s2	
2	0 a 2	b b a $	s6	
3	0 a 2 b 6	b a $	s9	
4	0 a 2 b 6 b 9	a $	s8	
5	0 a 2 b 6 b 9 a 8	$		

LR table

State	ACTION			GOTO	
	a	b	$	S'	S
18	s5	◉ s6 / ○ r_3			23
19			r_2		
20	◉ s8 / ○ r_3	s9			24
21	◉ s8 / ○ r_3	s9			25
22		r_1			
23		r_2			
24	r_1				
25	r_2				