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Slot:- $A_2 + TA_2 + TAA_2$

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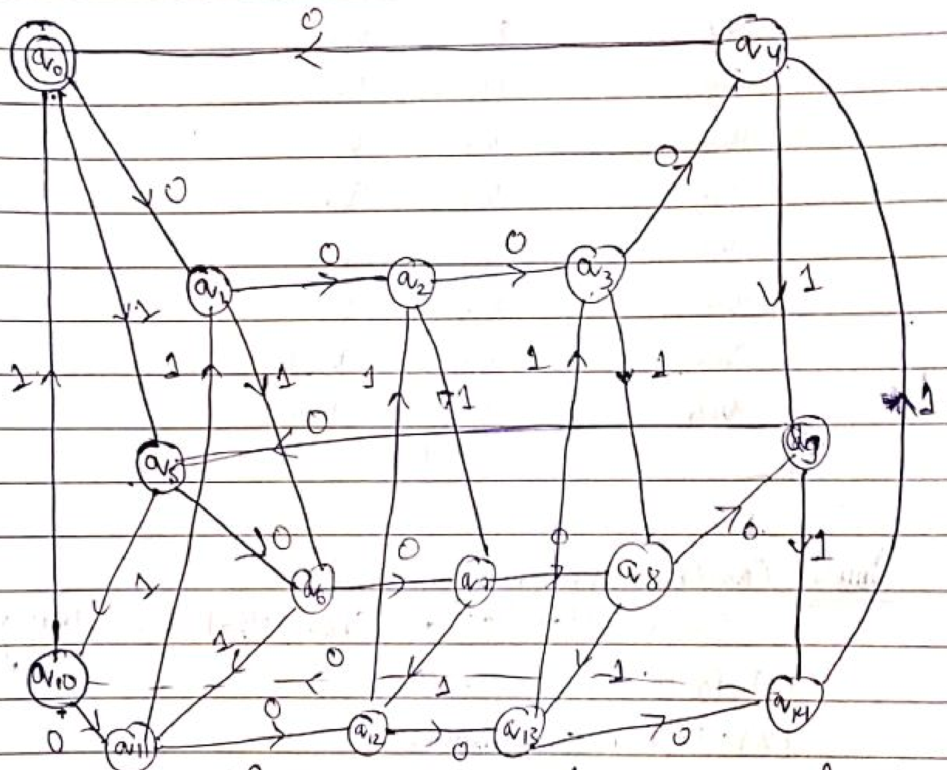
Theory of Computation
DA-1

Que:-1 Design a DFA that accepting the following languages over alphabet {0,1}
{The set of strings such that the number of 0's is divisible by 5, and the number of 1's divisible by 3.}

Ans:-1.



The above DFA = $< Q, \Sigma, \delta, q_0, F >$ represents no. of 0's divisible by 5 and no. of 1's divisible by 3.

State	Input	
	0	1
$\rightarrow q_0$	q_1	q_5
q_1	q_2	q_6
q_2	q_3	q_7
q_3	q_4	q_8
q_4	q_0	q_9
q_5	q_6	q_{10}
q_6	q_7	q_{11}
q_7	q_8	q_{12}
q_8	q_9	q_{13}
q_9	q_{15}	q_{14}
q_{10}	q_{11}	q_0
q_{11}	q_{12}	q_1
q_{12}	q_{13}	q_2
q_{13}	q_{14}	q_3
q_{14}	q_{10}	q_4

Ques-2 Consider the Grammar G :

$S \rightarrow S+S \mid S*S \mid (S) \mid a$. Show that the string $a+a*a$ has two

(1) Parse trees

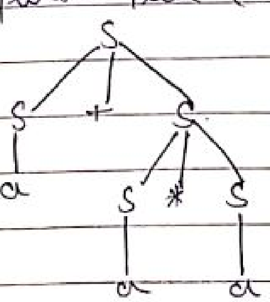
(2) left most derivations

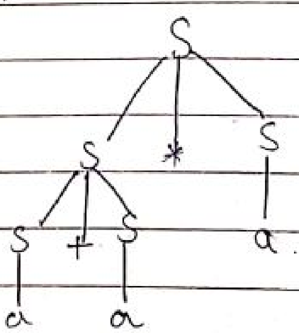
(3) Find the unambiguous grammar G' equivalent to G and show that $L(G) = L(G')$ and G' is unambiguous

Ans-2 Given the grammar $S \rightarrow S+S \mid S*S \mid (S) \mid a$

given string $w = a+a*a \in L(G)$ — ①

(i) parse tree (using LMD)





(ii) left most derivations.

$S \to S+S$
$\to a+S$
$\to a+S*S$
$\to a+a*S.$
$\to a+a*a.$

$S \to S*S$
$\to S+S*S.$
$\to a+S*S.$
$\to a+a*S.$
$\to a+a*a.$

(iii) $S \to S+T/T$
$T \to T*F/F$
$F \to (S)/a$
$\Big\}\ G'$

Checking for string.
$x = a+a*a$ in $L(G')$ — (2)

<u>LMD</u>

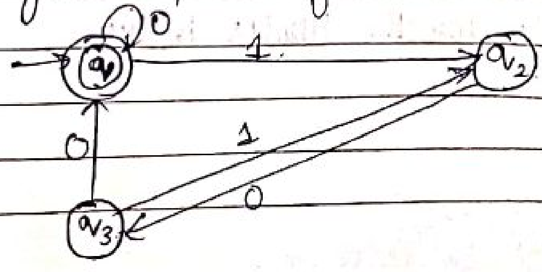
$S \to S+T$
$\to T+T$
$\to F+T$
$\to a+T$
$\to a+T*F$
$\to a+F*F$
$\to a+a*F$
$\to a+a*a$

<u>RMD</u>

$S \to S+T$
$\to S+S*F$
$\to S+T*a.$
$\to S+F*a.$
$\to S+a*a.$
$\to T+a*a.$
$\to F+a*a.$
$\to a+a*a.$

As only 1 LMD and 1 RMD exist.
$\therefore$ G' is unambiguous grammar
Using (1) and (2), $L(G) = L(G')$

Ques:3 Consider the transition system of given fig.. Derive the regular expression for the FA



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Ans 3 Using Arden's Theorem:

find the eq^ns

$$q_1 = q_1 0 + q_2 0 + \epsilon \quad \text{--- (1)}$$

$$q_2 = q_1 1 + q_2 1 + q_3 1 \quad \text{--- (2)}$$

$$q_3 = q_2 0 \quad \text{--- (3)}$$

put (3) in (2)

$$q_2 = q_1 1 + q_2 1 + (q_2 0) 1$$

$$q_2 = q_1 1 + q_2 (1 + 01) \quad \text{--- (4)}$$

It is in the form $R = Q + RP$

$\therefore$ sol^n is $R = QP^*$ (using Ardens)

$$q_2 = q_1 1 (1 + 01)^* \quad \text{--- (5)}$$

put (3) in (1)

$$q_1 = q_1 0 + q_2 00 + \epsilon .$$

put (5) in above eq^n

$$q_1 = q_1 0 + (q_1 1 (1+01)^*) 00 + \epsilon$$

$$q_1 = \epsilon + q_1 (0 + 1(1+01)^* 00)$$

It is in the form $R = Q + RP$

$\therefore$ sol^n is $R = QP^*$ (using Ardens)

$$q_1 = \epsilon (0 + 1(1+01)^* 00)^*$$

$$\boxed{q_1 = (0 + 1(1+01)^* 00)^*}$$

this gives the RE for given FA.

Ques 4 Consider the regular expression given below

$$a = (a+b)^* ab$$

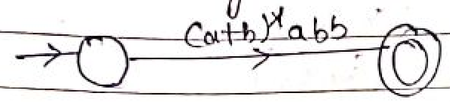
(i) Find the NFA without ε-moves for r

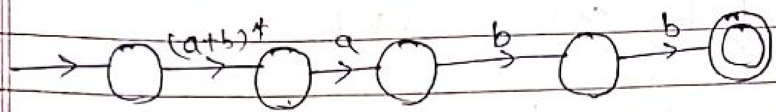
(ii) Convert the resulted NFA in (i) into DFA.

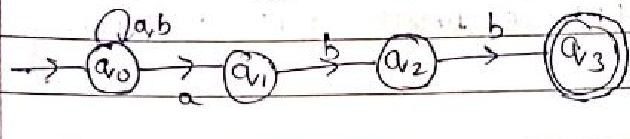
(iii) Find minimized DFA for the results in (ii).

Ans 4 Given RE: $r = (a+b)^* abb$

(i) Constructing NFA without ϵ-moves.







(ii) Converting this NFA to DFA.

Transition table for NFA:

State	Input a	Input b
q_0	$\{q_0, q_1\}$	$\{q_0\}$
q_1	-	$\{q_2\}$
q_2	-	$\{q_3\}$
q_3	-	-

Let the DFA is $M' = \langle Q', \Sigma, \delta', q_0, F' \rangle$.

$\delta'([q_0], a) = [q_0, q_1]$ - new

$\delta'([q_0], b) = [q_0]$ - old

$\delta'([q_0, q_1], a) = [q_0, q_1] \cup \phi = [q_0, q_1]$ → old

$\delta'([q_0, q_1], b) = [q_0, q_2]$ - new

$\delta'([q_0, q_2], a) = [q_0, q_1]$ - old

$\delta'([q_0, q_2], b) = [q_0, q_3]$ - new

$\delta'([q_0, q_3], a) = [q_0, q_1]$ - old

$\delta'([q_0, q_3], b) = [q_0]$ - old.

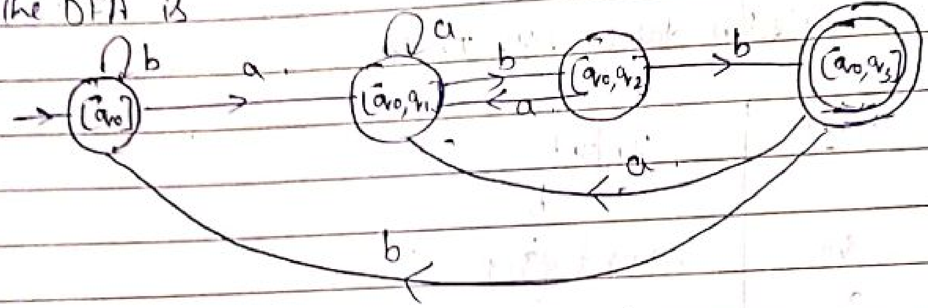
Transition table for DFA:

States	a	b
→ $[q_0]$	$[q_0, q_1]$	$[q_0]$
$[q_0, q_1]$	$[q_0, q_1]$	$[q_0, q_2]$
$[q_0, q_2]$	$[q_0, q_1]$	$[q_0, q_3]$
$[q_0, q_3]$	$[q_0, q_1]$	$[q_0]$

final state of DFA is ~~more~~ state containing state q_3 is

$F' \to [q_0, q_3]$

The DFA is



(ii) Now, minimizing the above DFA

Let $[q_0] = A$, $[q_0, q_1] = B$, $[q_0, q_2] = C$, $[q_0, q_3] = D$.

State	a	b
→ A	B	A
B	B	C
C	B	D
D	B	A

$S_0 = \{\underbrace{\{A, B, C\}}_{I}, \underbrace{\{D\}}_{II}\}$ (based on final and non-final states)

I on a

$A \xrightarrow{a} B$
$B \xrightarrow{a} B$
$C \xrightarrow{a} B.$
} I.

No partition.

I on B

$A \xrightarrow{b} A$
$B \xrightarrow{b} C$
} I

$C \xrightarrow{b} D$ } II

partition

$S_1 = \{ \underbrace{\{A, B\}}_{I}, \underbrace{\{C\}}_{II}, \underbrace{\{D\}}_{III} \}$.

I on A:

$A \xrightarrow{a} B$
$B \xrightarrow{a} B$ } I

No partition.

I on B:

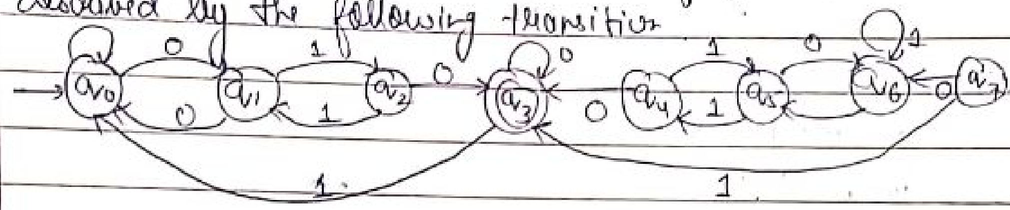
$A \xrightarrow{b} A$ } I
$B \xrightarrow{b} C$ } II

partition.

$S_2 = \{\{A\}, \{B\}, \{C\}, \{D\}\}$.

Since no states can be combined.
Therefore DFA obtained in (ii) is minimized DFA.

Ques:5 Find the minimum-state DFA equivalent to the DFA described by the following transition



Ans:5 Transition table for given DFA.

State	0	1
$\rightarrow q_0$	q_1	q_0
q_1	q_0	q_2
q_2	q_3	q_1
q_3	q_3	q_0
q_4	q_3	q_5
q_5	q_6	q_4
q_6	q_5	q_6
q_7	q_6	q_3

grouping on basis of non final and final states.

$S_0 = \{ \underbrace{\{q_0, q_1, q_2, q_4, q_5, q_6, q_7\}}_{I}, \underbrace{\{q_3\}}_{II} \}$

Transition on group I for all input symbols.

On 0

$q_0 \xrightarrow{0} q_1$

$q_1 \xrightarrow{0} q_0$

$q_2 \xrightarrow{0} q_3$ } II

$q_4 \xrightarrow{0} q_3$

$q_5 \xrightarrow{0} q_6$

$q_6 \xrightarrow{0} q_5$

$q_7 \xrightarrow{0} q_6$

Partition

On 1

$q_0 \xrightarrow{1} q_0$

$q_1 \xrightarrow{1} q_2$

$q_2 \xrightarrow{1} q_1$

$q_4 \xrightarrow{1} q_5$

$q_5 \xrightarrow{1} q_4$

$q_6 \xrightarrow{1} q_6$

$q_7 \xrightarrow{1} q_3$ } II

Partition.

$S_1 = \{\underbrace{\{q_0, q_1, q_5, q_6\}}_{I}, \underbrace{\{q_2, q_4\}}_{II}, \underbrace{\{q_7\}}_{III}, \underbrace{\{q_3\}}_{IV}\}$

Considering group I

On 0

$q_0 \xrightarrow{0} q_1$

$q_1 \xrightarrow{0} q_0$

$q_5 \xrightarrow{0} q_6$

$q_6 \xrightarrow{0} q_5$

} I

no partition

On 1.

$q_0 \xrightarrow{1} q_0$

$q_1 \xrightarrow{1} q_2$ } II

$q_5 \xrightarrow{1} q_4$

$q_6 \xrightarrow{1} q_6$

partition

Consider group II

On 0

$q_2 \xrightarrow{0} q_3$ } I

$q_4 \xrightarrow{0} q_3$

no partition.

On 1.

$q_2 \xrightarrow{1} q_1$ } I.

$q_4 \xrightarrow{1} q_5$

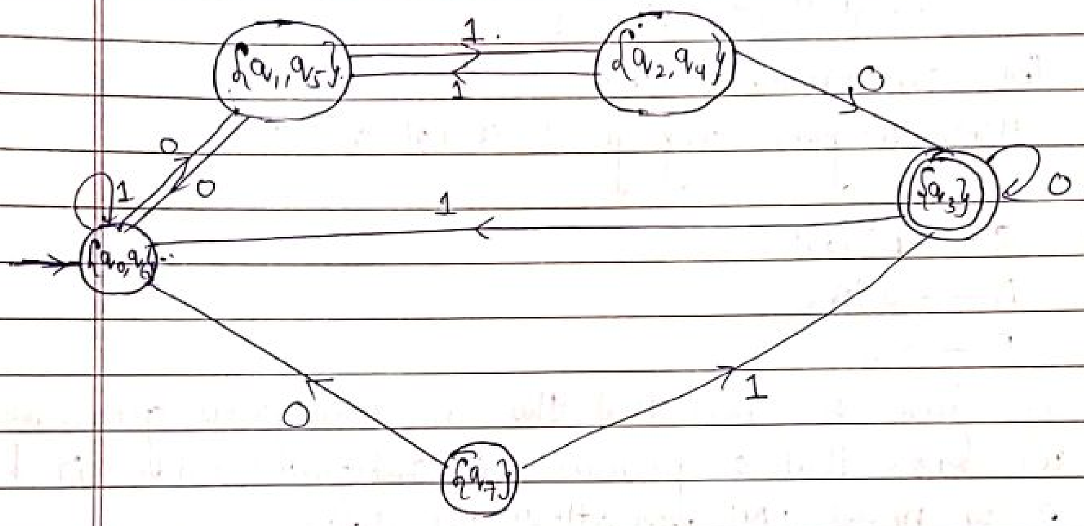
no partition

$S_2 = \{\{q_0, q_6\}, \{q_1, q_5\}, \{q_2, q_4\}, \{q_7\}, \{q_3\}\}$

No further separation possible.

$\Rightarrow$ S_2 denotes states of minimized DFA.

States	0	1
$\rightarrow\{q_0, q_6\}$	$\{q_1, q_5\}$	$\{q_0, q_6\}$
$\{q_1, q_5\}$	$\{q_0, q_6\}$	$\{q_2, q_4\}$
$\{q_2, q_4\}$	$\{q_3\}$	$\{q_1, q_5\}$
$\{q_3\}$	$\{q_3\}$	$\{q_0, q_6\}$
$\{q_4\}$	$\{q_0, q_6\}$	$\{q_3\}$



This is minimized DFA.

Ques:6 (i) Show that the language $L = \{ww : w \in \{a,b\}^*\}$ is not a ~~complulsory~~ context free language by using the same
(ii) Show that the following grammar is ambiguous.
$S \rightarrow AB \mid aaB$, $A \rightarrow a \mid Aa$, $B \rightarrow b$
(iii) Construct a PDA to accept the language $L = \{0^{3n} 12 \mid n >= 0\}$ and $\Sigma = \{0, 1, 2\}$ by final state.

Ans:6 (i) $L = \{ww \mid w \in \{a,b\}^*\}$
we have to prove that L is not CFL.
Proof:- let L is a CFL
let L is an infinite language
if $\omega = a^m b^m$, $m > 0$
for the string $= a^m b^m a^m b^m \in L$

Case(i) vxy located in a^m

$\underbrace{a\,a}_{u}\overset{m}{\dots}\underbrace{a\,a.}_{vxy}\; \overbrace{b\,b \dots b\,b.}^{m}\; \overbrace{a\,a \dots a\,a}^{m}\; \overbrace{b\,b \dots b\,b}^{m}$ (z)

Let $v = a^{k_1}$; $y = a^{k_2}$ so that $|vy| \geq 1$, $|vxy| \leq m$ then
$uv^ixy^iz \in L \;\forall\; i = 0,1,2,3.$

let $i = 2$

$uv^2xy^2z \in L$

$a^{m-k_1-k_2}\,a^{2k_1}\,a^{m-k_1}\,a^{2k_2}\,b^m a^m b^m$

$\Rightarrow a^{m+k_2}\,b^m a^m b^m \notin L$

Thus contradiction occurs,

Hence the given language L is not a CFL

(ii) $S \longrightarrow AB \,|\, aaB$

$A \longrightarrow a \,|\, Aa$

$B \longrightarrow b$

we have to show that this is ambiguous grammar. Ans:-7

we know that a grammar is ambiguous when it has 2 or more LMD for atleast one string.

Let string be 'aab'.

using LMD

$S \longrightarrow AB$ $\qquad\qquad$ $S \longrightarrow aaB$

$\longrightarrow AaB$ $\qquad\qquad$ $\longrightarrow aab$

$\longrightarrow aaB$

$\longrightarrow aab.$

Since 2 LMD exist for 'aab'

Hence given grammar is ambiguous.

(iii) $L = \{0^{3n}1\,2 \mid n >= 0\}$

we have to draw PDA to accept L by final state.

Logic:- Push first 0 in stack

Perform no operation for second 0.

Pop the 0 present in stack when third 0 is read.

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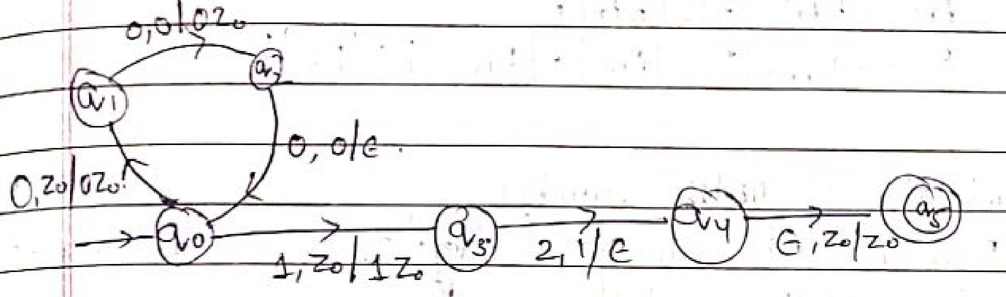
Ques: 7

Push 1 in stack.

Pop 1 when 2 is read.



Que: 7 (i) Simplify the CFG and convert into CNF:

$S \to abAB,\ A \to bAB \mid \epsilon,\ B \to BAa \mid A \mid \epsilon.$

(ii) Find the Context free grammar for the following language

$L = \{a^n b^m \mid n <= m+3,\ n, m >= 0\}$

Ans: 7 (i) $S \to abAB$

$A \to bAB \mid \epsilon$

$B \to BAa \mid A \mid \epsilon.$

This is given CFG, we want to convert it to CNF.

(i) Elimination of ϵ production.

$A \to \epsilon$

$S \to abAB \mid abB$

$A \to bAB \mid bB$

$B \to BAa \mid A \mid Ba \mid \epsilon.$

$B \to \epsilon.$

$S \to abAB \mid abB \mid abA \mid ab.$

$A \to bAB \mid bB \mid bA \mid b.$

$B \to BAa \mid A \mid Ba \mid Aa \mid a.$

Checking with $A \to \epsilon,\ B \to \epsilon.$

$S \to abAB \mid abB \mid abA \mid ab.$

$A \to bAB \mid bB \mid bA \mid b.$

$B \to BAa \mid A \mid Ba \mid Aa \mid a.$

(ii) Elimination of unit production

$S \rightarrow abAB \mid abB \mid abA \mid ab$

$A \rightarrow bAB \mid bB \mid bA \mid b$

$B \rightarrow BAa \mid Ba \mid Aa \mid a \mid bAB \mid bB \mid bA \mid b.$

(iii) Elimination of useless symbol

Both A and B are generating as well as reachable

$\Rightarrow$ no useless symbol

(iv) Converting terminal to non-terminal

$X_a \rightarrow a$

$X_b \rightarrow b$

$S \rightarrow X_aX_bAB \mid X_aX_bB \mid X_aX_bA \mid X_aX_b$

$A \rightarrow X_bAB \mid X_bB \mid X_bA \mid b$

$B \rightarrow BAX_a \mid BX_a \mid AX_a \mid X_bAB \mid X_bB \mid X_bA \mid a \mid b.$

(v) Restriction on RHS to 2NT's.

$S \rightarrow X_aP \mid X_aQ \mid X_aR \mid X_aX_b$

$A \rightarrow X_bU \mid X_bB \mid X_bA \mid b$

$B \rightarrow BT \mid BX_a \mid AX_a \mid X_bU \mid X_bB \mid X_bA \mid a \mid b.$

$P \rightarrow X_bU$

$Q \rightarrow X_bB$

$R \rightarrow X_bA$

$U \rightarrow AB.$

$T \rightarrow AX_a$

$X_a \rightarrow a$

$X_b \rightarrow b$

This is CNF ~~form~~ form of given grammar.

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7 (ii) $L = \{a^n b^m \mid n \leq m+3 \ , n, m \geq 0\}$

we have to find CFG for this language.

$S \longrightarrow aSb \mid A \mid B$

$A \longrightarrow a \mid aa \mid aaa \mid \epsilon$

$B \longrightarrow bB \mid b$

→ This is CFG for given language.

Ques-8 Given the CFG, $S \to abAB$, $A \to bAB \mid \lambda$, $B \to Baa \mid A \mid \lambda$, prove that the string $w = abbaa$ is the member of given Grammar (using Membership Algorithm).

Ans-8 $S \longrightarrow abAB$

$A \longrightarrow bAB \mid \lambda$

$B \longrightarrow Baa \mid A \mid \lambda$

(Take $\lambda = \epsilon$).

$A \to \epsilon$

$S \to abAB \mid abB$

$A \to bAB \mid bB$

$B \to Baa \mid A \mid \lambda$.

$B \to \epsilon$

$S \to abAB \mid abB \mid abA \mid ab$.

$A \to bAB \mid bB \mid bA \mid b$.

$B \to Baa \mid A \mid aa$.

Checking with $A \to \epsilon$ and $B \to \epsilon$ gives same Only.

(ii) Elimination of unit production.

$S \longrightarrow abAB \mid abB \mid abA \mid ab$.

$A \longrightarrow bAB \mid bB \mid bA \mid b$

$B \longrightarrow Baa \mid bAB \mid bB \mid bA \mid b \mid aa$

(iii) No useless symbol

(iv) Converting terminals to NT.

$X_a \to a$, $X_b \to b$.

$$S \to X_aX_bAB \mid X_aX_bB \mid X_aX_bA \mid X_aX_b$$
$$A \to X_bAB \mid X_bB \mid X_bA \mid b$$
$$B \to BX_aX_b \mid X_bAB \mid X_bB \mid X_bA \mid b \mid X_aX_a$$

(v) Restricting no. of NT in RHS to 2.

$$S \to X_aP \mid X_aQ \mid X_aR \mid X_aX_b$$
$$A \to X_bT \mid X_bB \mid X_bA \mid b$$
$$B \to BU \mid X_bT \mid X_bB \mid X_bA \mid b \mid X_aX_a$$
$$P \to X_bT$$
$$T \to AB$$
$$Q \to X_bB$$
$$R \to X_bA$$
$$U \to X_aX_a$$
$$X_a \to a$$
$$X_b \to b$$

$W = abbbaa$

X_{16}					
X_{15}	X_{26}				
X_{14}	X_{25}	X_{36}			
X_{13}	X_{24}	X_{35}	X_{46}		
X_{12}	X_{23}	X_{34}	X_{45}	X_{56}	
X_{11}	X_{22}	X_{33}	X_{44}	X_{55}	X_{66}
a	a	b	b	a	a

$X_{11} = \{X_a\}$, $X_{22} = \{A, B, X_B\}$, $X_{33} = \{A, B, X_b\}$, $X_{44} = \{A, B, X_b\}$
$X_{55} = \{X_a\}$, $X_{66} = \{X_a\}$

$X_{12} = \{S\}$, $X_{23} = \{T, A, B, P, Q\}$, $X_{34} = \{T, A, B, P, Q\}$, $X_{45} = \{\phi\}$.
$X_{56} = \{B, U\}$

$X_{13} = \{X_{11}, X_{23}\} \cup \{X_{12}, X_{33}\}$.
$= \{S\}$

$X_{24} = \{X_{22}, X_{34}\} \cup \{X_{23}, X_{44}\}$.
$= \{T, A, B, P, P, Q\}$.

$X_{35} = \{(X_{33}, X_{45}) \cup (X_{34}, X_{55})\}$.
$= \phi$

$X_{46} = \{(X_{44}, X_{56}) \cup (X_{45}, X_{66})\}$.
$= \{T, A, B, Q\}$.

$X_{14} = \{X_{11}, X_{24}\} \cup \{X_{12}, X_{34}\} \cup \{X_{13}, X_{44}\}$
$= \{S\}$

$X_{25} = \{X_{22}, X_{35}\} \cup \{X_{23}, X_{45}\} \cup \{X_{24}, X_{55}\}$.
$= \{\phi\}$.

$X_{36} = \{X_{33}, X_{46}\} \cup \{X_{34}, X_{56}\} \cup \{X_{35}, X_{66}\}$
$= \{T, A, B, P, R, Q\}$

$X_{15} = \{(X_{11}, X_{25}) \cup (X_{12}, X_{35}) \cup (X_{13}, X_{45}) \cup (X_{14}, X_{55})\}$.
$= \{\phi\}$.

$X_{26} = \{(X_{22}, X_{36}) \cup (X_{23}, X_{46}) \cup (X_{24}, X_{56}) \cup (X_{25}, X_{66})\}$.
$= \{T, A, B, P, R, Q\}$.

$X_{16} = \{(X_{11}, X_{26}) \cup (X_{12}, X_{36}) \cup (X_{13}, X_{46}) \cup (X_{14}, X_{56}) \cup (X_{15}, X_{66})\}$.
$= \{S\}$ → contains S, therefore Accepted.

Ques:9 For the given grammar check if it is LL(1) parser or SLR(0) parser or Both. (Give reason). Justify your result by constructing parse table and check for the string i) $w = bed$ (ii) $w = *id = id$ (Respectively for i) and ii))

| a | b | d | e |

is accepted or no. Check if there is any shift/Reduce or Reduce/Reduce conflicts.

(i) S → aAd | bBd | aBm | bAm

A → e

B → e.

(ii) S → L = R | R

L → *R | id

R → L.

Ans: S → aAd / bBd / aBm / bAm

A → e

B → e.

checking for LL(1) parser

→ No left recursion

→ Eliminating left factoring

S → aX / bY

X → Ad / Bm

Y → Bd / Am

A → e

B → e.

Find first and follow.

	First	follow.
S	{a,b}	{\$}
X	{e}	{\$}
Y	{e}	{\$}
A	{e}	{d,m}
B	{e}	{d,m}

Parse Table:

	a	b	d	e		m	$
S	S→aX	S→bY					
X				X→Ad X→Bm			
Y				Y→Bd Y→Am			
A				A→e			
B				B→e			

Since a single cell contains more than one components

Hence it is not LL(1).

· Since it is not LL(1). Therefore, if we check for string:

ω = bed

Stack	Input	Production
S$	bed $	[S,b) → bY
~~b~~Y$	~~b~~ed $	
Y$	ed $	[Y,e] → multiple productions to choose from

Hence LL(1) fails.

Checking for SLR parser.

S' → S

S → aAd (1) | bBd (2) | aBm (3) | bAm (4)

A → e (5)

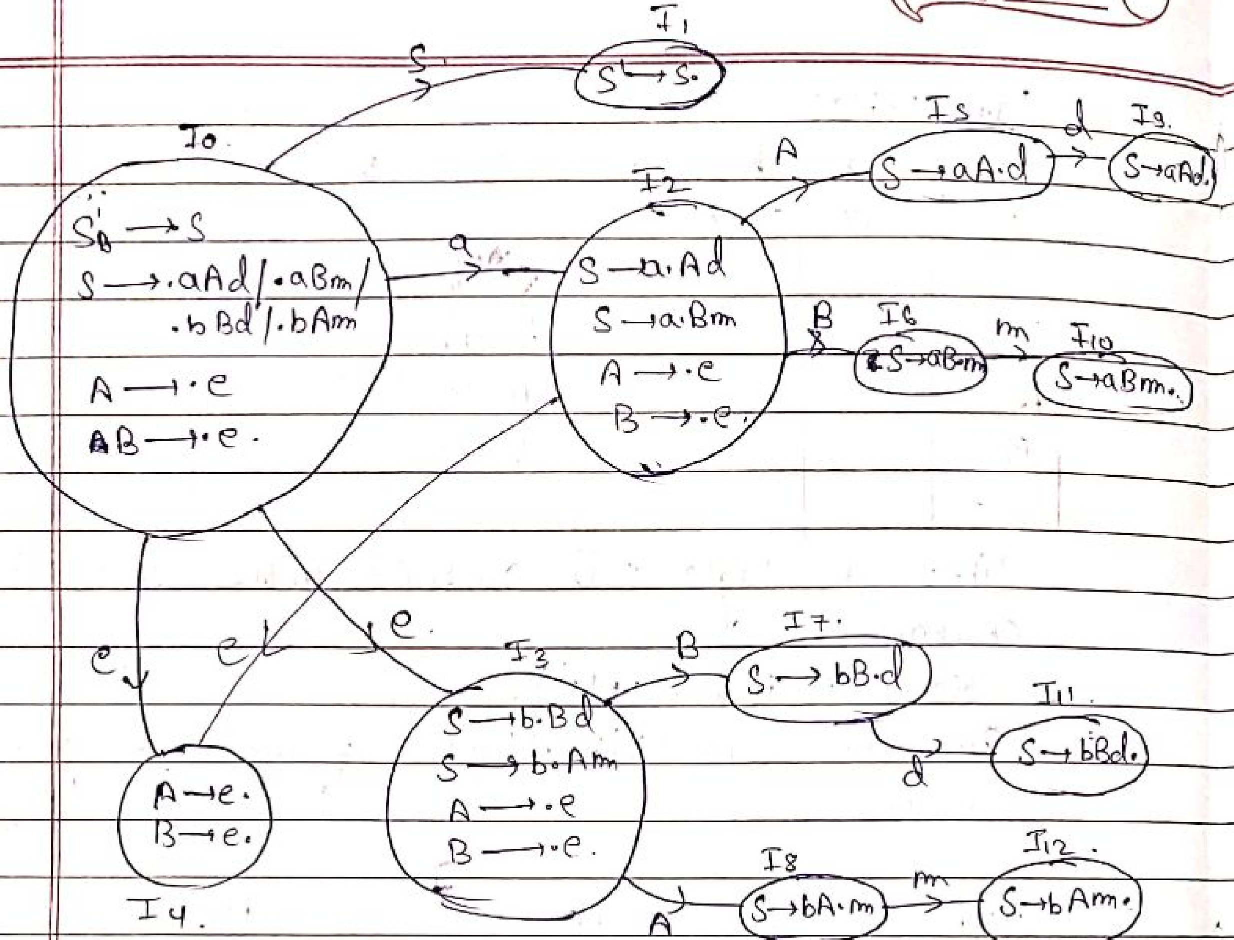
B → e (6)

items. S' → .S

S → .aAd | .bBd | .aBm | .bAm

A → .e

B → .e



	Follow
S	{$}
A	{d, m}
B	{d, m}

State	Action						Goto		
	a	b	d	e	m	$	S	A	B
0	S_2	S_3		S_4			1		
1									
2				S_4				5	6
3				S_4				8	7
4			r_5/r_6		r_5/r_6				
5			S_9						
6					S_{10}				
7			S_{11}						
8					S_{12}				
9									
10						r_1			
11						r_3			
12						r_2			
						r_4			

Date ____
Page ____

Since reduce - reduce conflict is there in the table hence it is not SLR parser.

w = bed

stack	input	Rule
\$ 0	bed \$	[0,b] = S3
\$ 0b3	ed \$	(3,e) = S4
\$ 0b3e4	d \$	[4,d] = r5/r6

conflict

therefore string not accepted [parser can't decide]

(ii) $S \longrightarrow L = R / R$

$L \longrightarrow * R \mid id$

$R \longrightarrow L$

For LL(1) parser.

↳ no left recursion and left factoring.

	First	Follow
S	{*, id}	{\$}
L	{*, id}	{=, \$}
R	{*, id}	{=, \$}

Parse Table :

	=	*	id	\$
S		S→L=R S→R	S→L=R S→R	
L		L→*R	L→id	
R		R→L	R→L	

Scanned by CamScanner

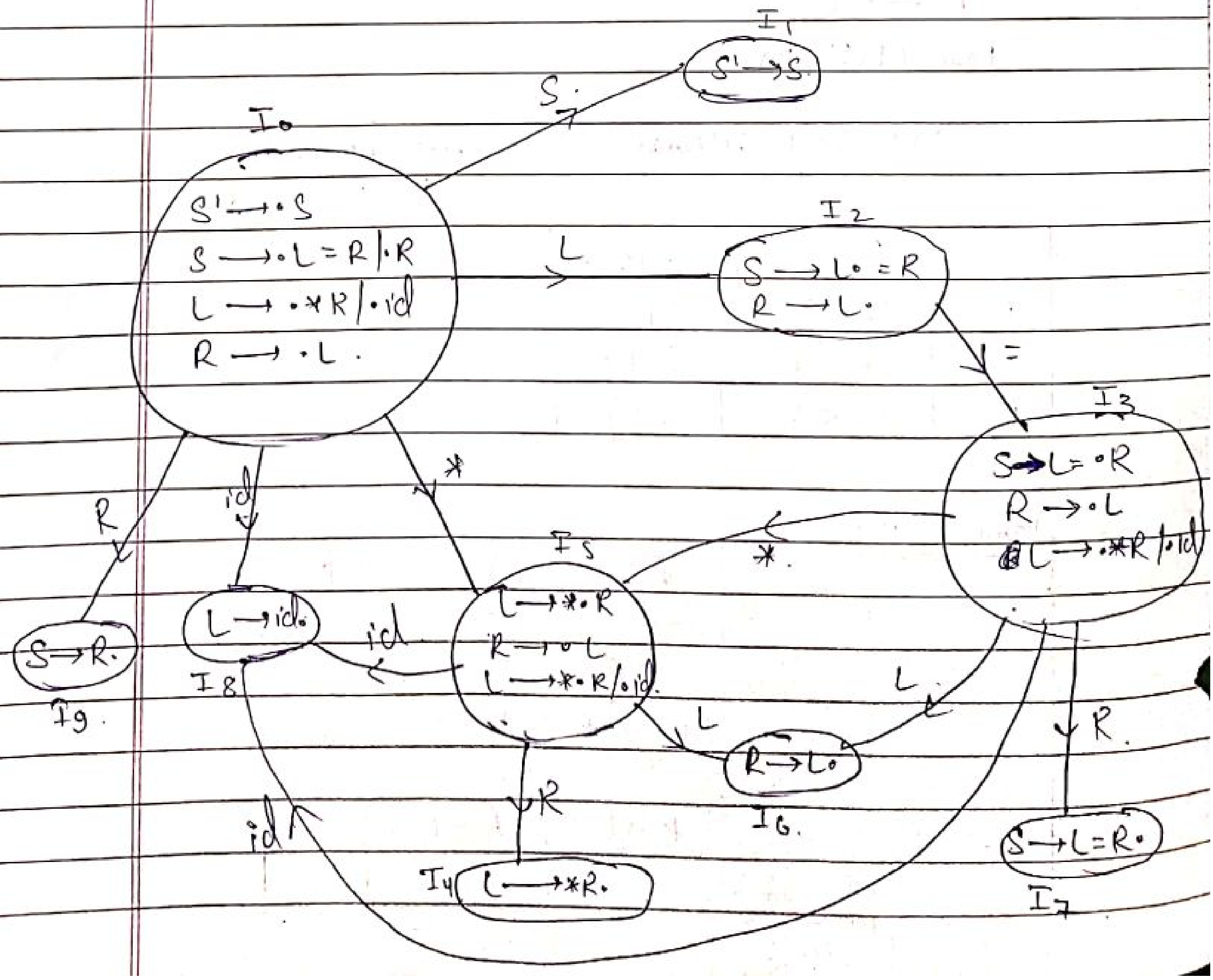
Since a single cell has more than one entry in a cell.
Therefore, it is not LL(1) parser.
Checking for string $\omega = *id = id$.

Stack	Input	Reduction.
S\$	$*id = id$	[S,*] → multiple production to choose from.

Hence LL(1) fails.

For SLR parser.

$S' \longrightarrow \cdot S.$
$S \longrightarrow \cdot L = R \mid \cdot R$ ① ②
$L \longrightarrow \cdot * R \mid \cdot id$ ③ ④
$R \longrightarrow \cdot L$ ⑤



Parse table.

	Follow.
S	{\$}
L	{=, \$}
R	{=, \$}.

States	Action				Goto		
	=	*	id	\$	S	L	R
0		S_5	S_8		1	2	9
1				accept.			
2	S_3/r_5			r_5			
3		S_5	S_8			6	7.
4	r_3			r_3			
5			S_8			6	4.
6	r_5			r_5			
7				r_1			
8	r_4			r_4			
9				r_2			

Checking for string $\omega = *id = id$

Stack	Input	Rule
\$0	* id = id \$	$[0,*] \rightarrow S_5$
\$0*5	id = id \$	$[5,id] \rightarrow S_8$
\$0*5$\underbrace{id\,8}$	= id \$	$[8,=] \rightarrow r_4$
\$0*5L6	= id \$	$[6,=] \rightarrow r_5$.
\$0*5R4	= id \$	$[4,=] \rightarrow r_3$
\$0L2.	= id \$	$[2,=] \rightarrow$ conflict occurs.

Since shift-reduce conflict occurs.
Therefore it is not SLR parser

Ques:10 For the given grammar construct CLR(1) parser. (Parse table also)

(i) $S \rightarrow id \mid B = D$ (ii) $S \rightarrow E$

(i) $B \rightarrow id$ $E \rightarrow (L) \mid r$

(iii) $D \rightarrow a \mid B$. $L \rightarrow EL$

Ans:10 (i) $S \rightarrow id \mid B = D$

$B \rightarrow id$

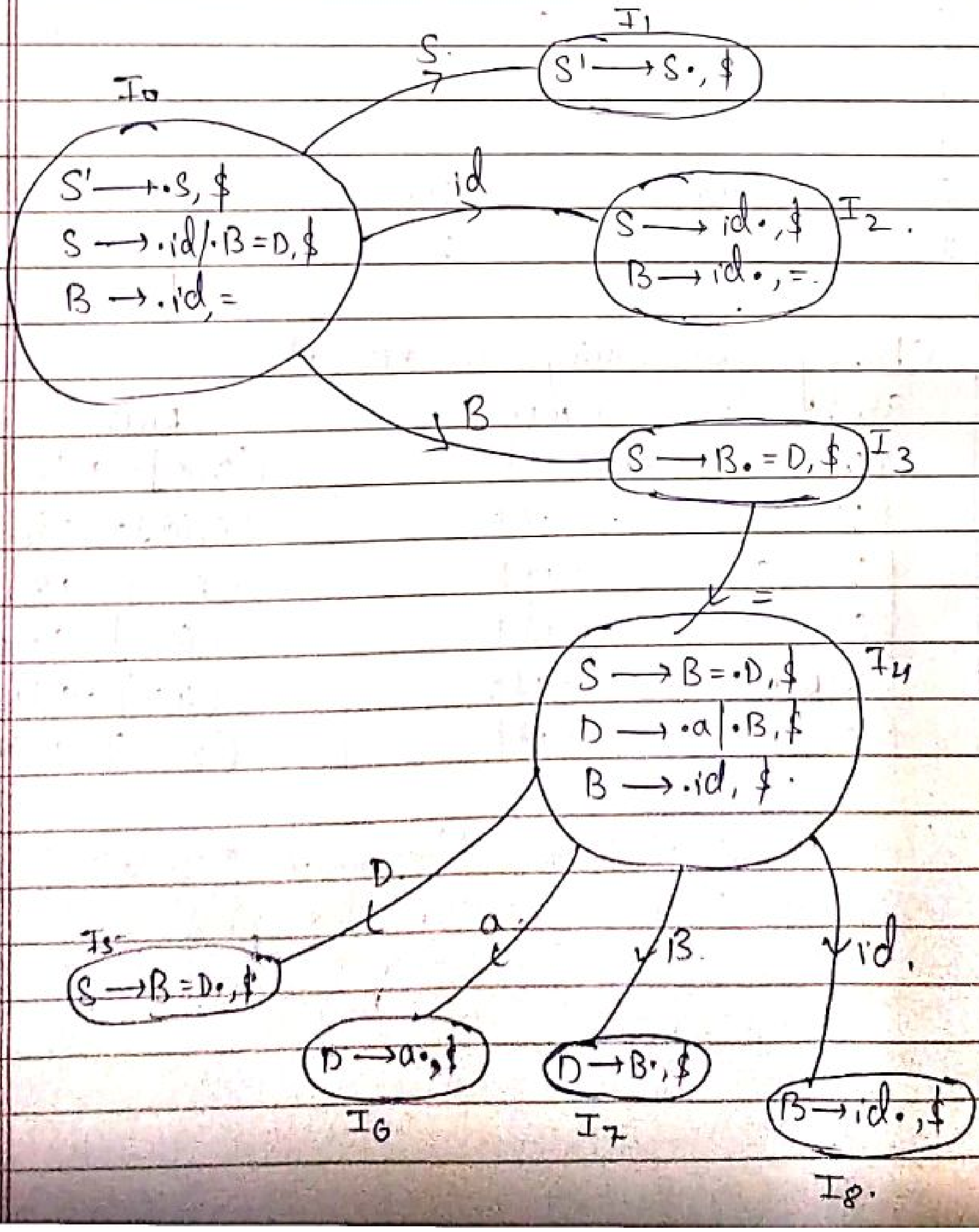
$D \rightarrow a \mid B$.

$S' \rightarrow .S, \$$

$S \rightarrow .id \mid .B = D, \$$

$B \rightarrow .id, =$

$D \rightarrow .a \mid .B,$



Parse Table for CLR(1)

State	Action				Goto		
	id	=	a	$	S	B	D
0	S_2				1	3	
1				accept			
2		r_3		r_1			
3		S_4					
4	S_8			S_6		7	5
5				r_2			
6				r_4			
7				r_5			
8				r_3			

(ii) $S \rightarrow E$

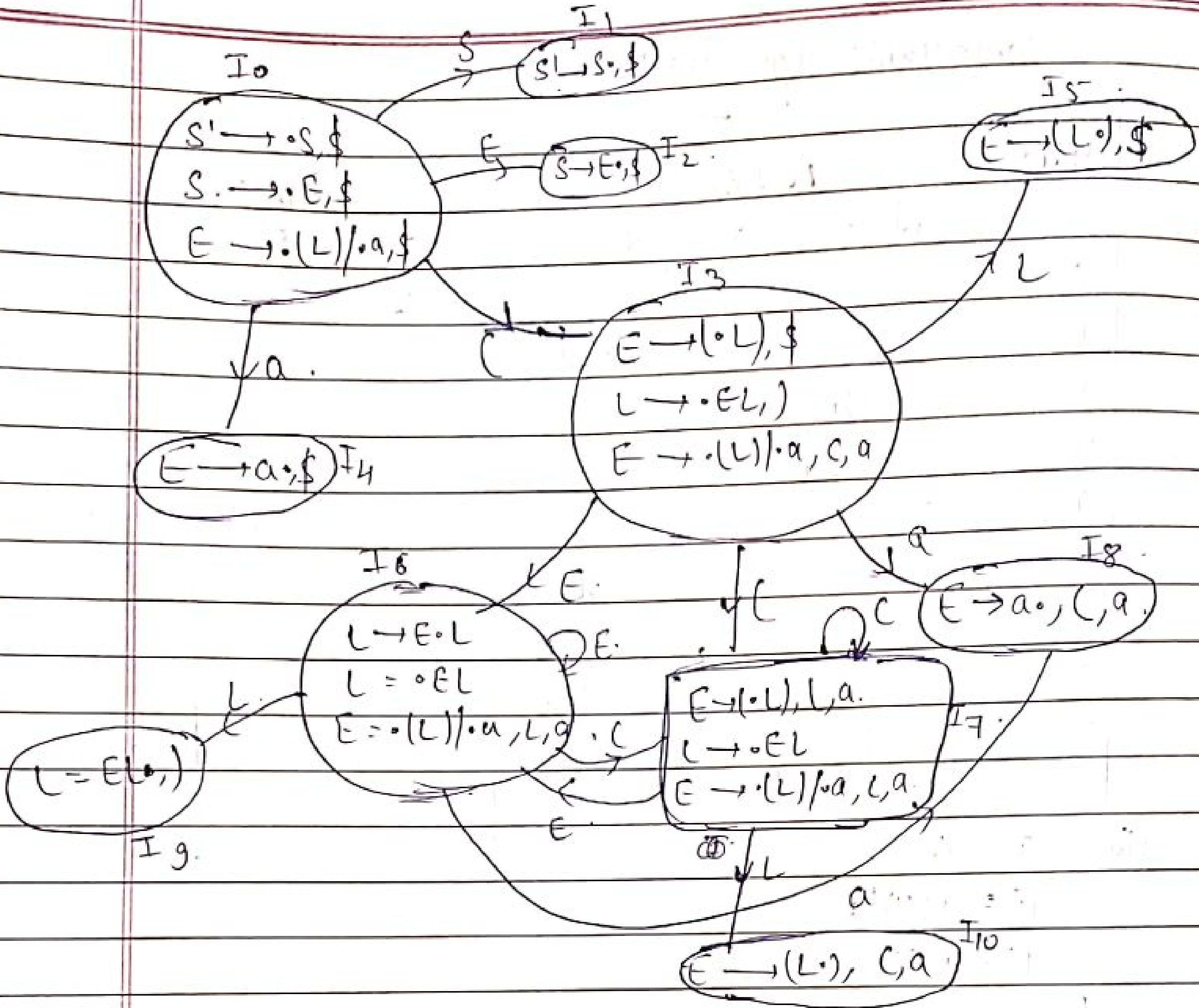
$E \rightarrow (L) / a$

$L \rightarrow EL$

for CLR(1) ⟶ LR(0) items + look ahead.

$$\left.\begin{array}{l} S' \longrightarrow \cdot S \\ S \rightarrow \cdot E \\ E \longrightarrow \cdot (L) / \cdot a \\ L \longrightarrow \cdot E L \end{array}\right\} \text{LR(0) items}$$

State Diagram and Table on next page.



Parse Table For CLR(1)

State	Action				Goto		
	(	)	a	$	S	E	L
0	S_3		S_4		1	2	
1				accept			
2				r_1			
3	S_7		S_8			6	5
4				r_3			
5				r_2			
6	S_7		S_8				
7	S_7		S_8				
8	r_3		r_3				
9		r_4					
10	r_2		r_2				