



# University of Asia Pacific

## Admit Card

Final-Term Examination of Fall, 2020

Financial Clearance

PAID

Registration No : 17101086

Student Name : Md. Remon Hasan Apu

Program : Bachelor of Science in Computer Science and Engineering



SI.NO.	COURSE CODE	COURSE TITLE	CR.HR.	EXAM. SCHEDULE
1	CSE 425	Computer Graphics	3.00	
2	CSE 426	Computer Graphics Lab	1.50	
3	CSE 429	Compiler Design	3.00	
4	CSE 430	Compiler Design Lab	1.50	
5	BUS 401	Business and Entrepreneurship	3.00	
6	BUS 402	Business and Entrepreneurship Lab	0.75	
7	CSE 457	Design and Testing of VLSI	3.00	
8	CSE 458	Design and Testing of VLSI Lab	0.75	
9	CSE 400	Project / Thesis	3.00	

Total Credit: 19.50

1. Examinees are not allowed to enter the examination hall after 30 minutes of commencement of examination for mid semester examinations and 60 minutes for semester final examinations.
2. No examinees shall be allowed to submit their answer scripts before 50% of the allocated time of examination has elapsed.
3. No examinees would be allowed to go to washroom within the first 60 minutes of final examinations.
4. No student will be allowed to carry any books, bags, extra paper or cellular phone or objectionable items/incriminating paper in the examination hall.  
Violators will be subjects to disciplinary action.

This is a system generated Admit Card. No signature is required.



# **University of Asia Pacific**

## **Department of Computer Science and Engineering**

**SEMESTER FINAL EXAM-FALL 2020**

**Course Name : Compiler Design**

**Course Code : CSE-429**

**Semester: 4th Year 2nd Semester**



**SUBMITTED By**

**Md. Remon Hasan Apu**

**ID: 17101086, Section: B**

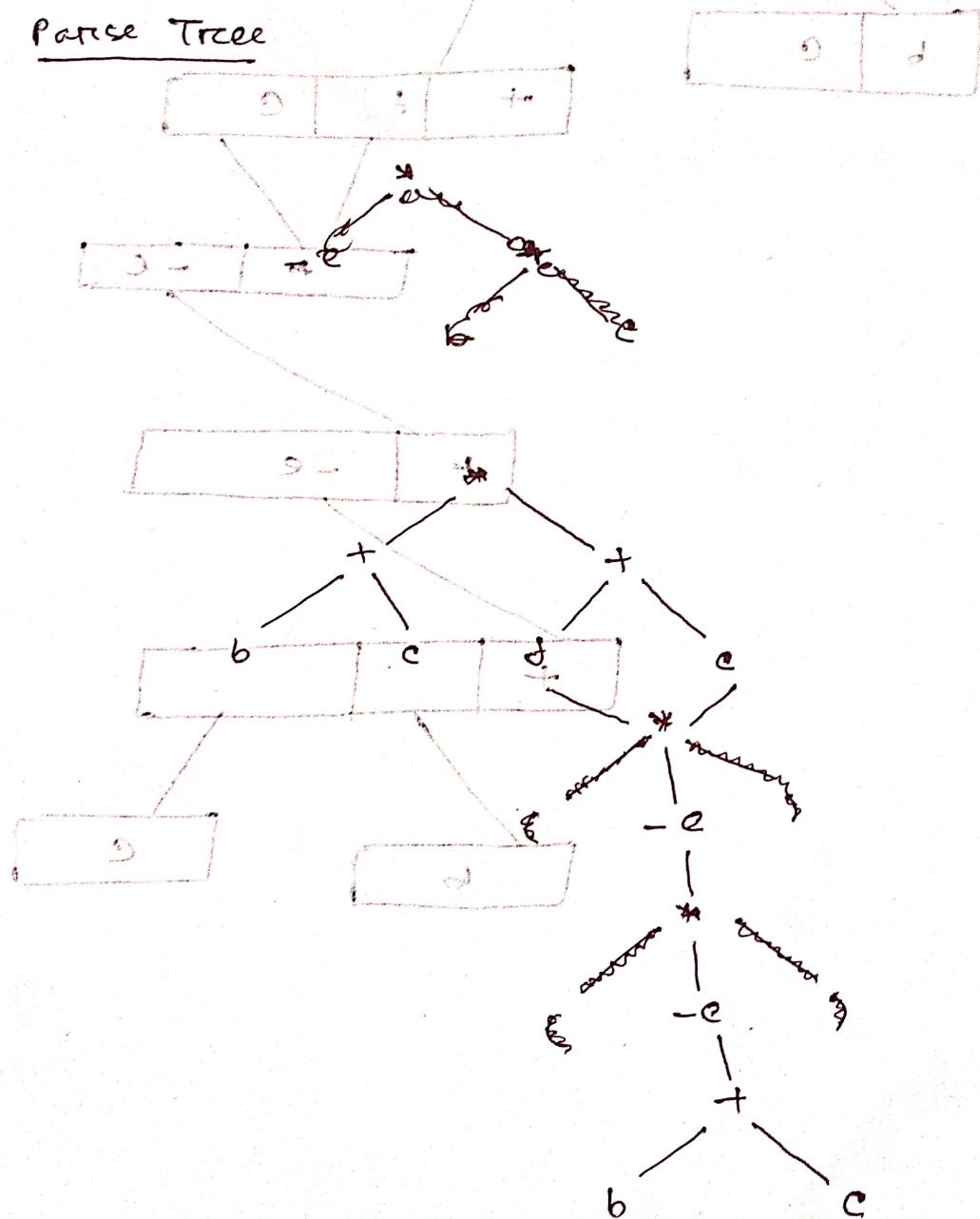
**Date: 26.04.2021**

~~Ques. No - 1 (a) (PFA) don't worry about matching~~

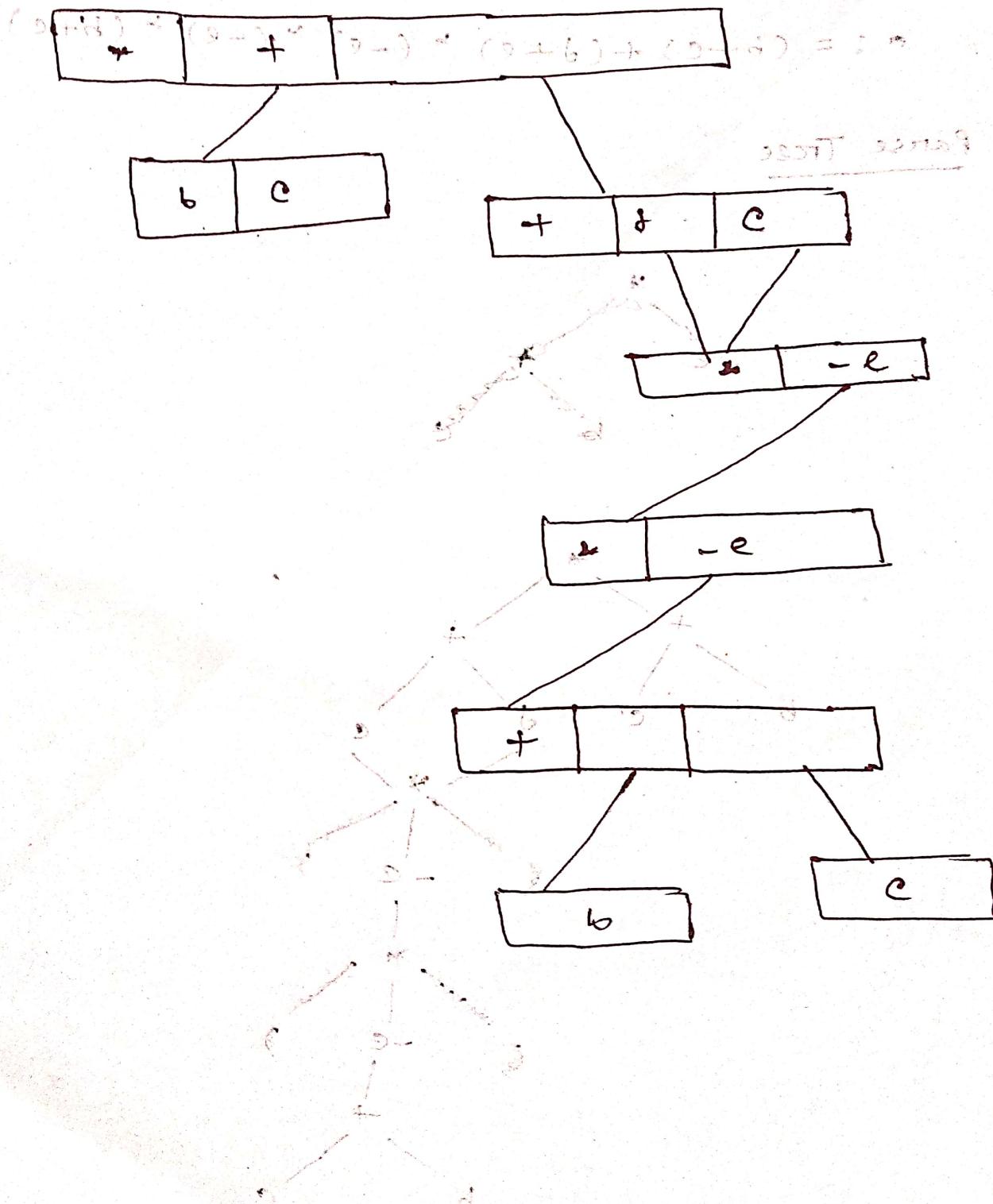
Ans: to the Q: No - 1 (a)

$$a := (b + c) + (d + e) * (-e) * (-e) * (b + c)$$

Parse Tree



## Abstract Syntax Tree (AST):



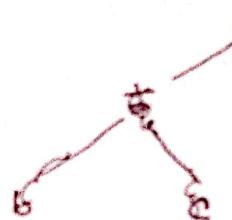
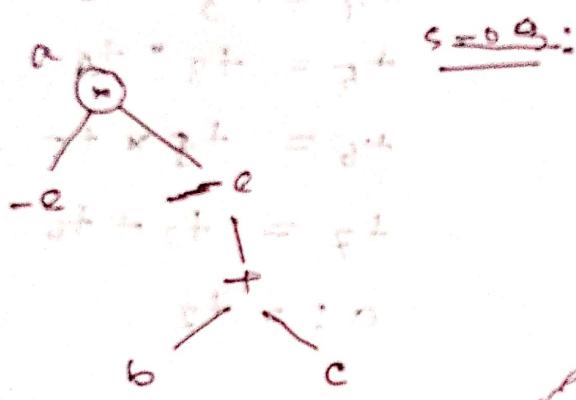
b) Directed Acyclic Graph of 1(a)

s-0 step:

s-01:

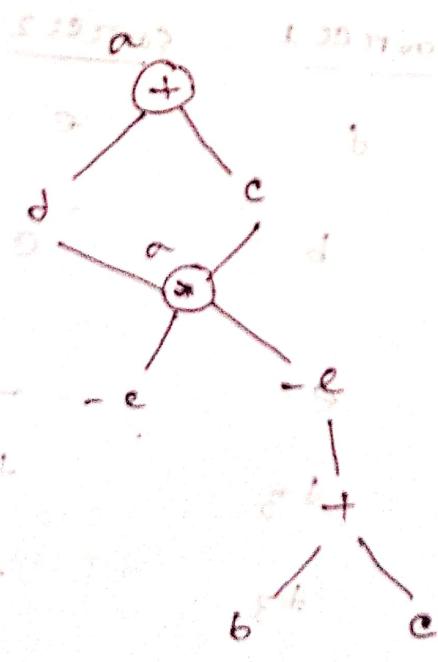


s-02:

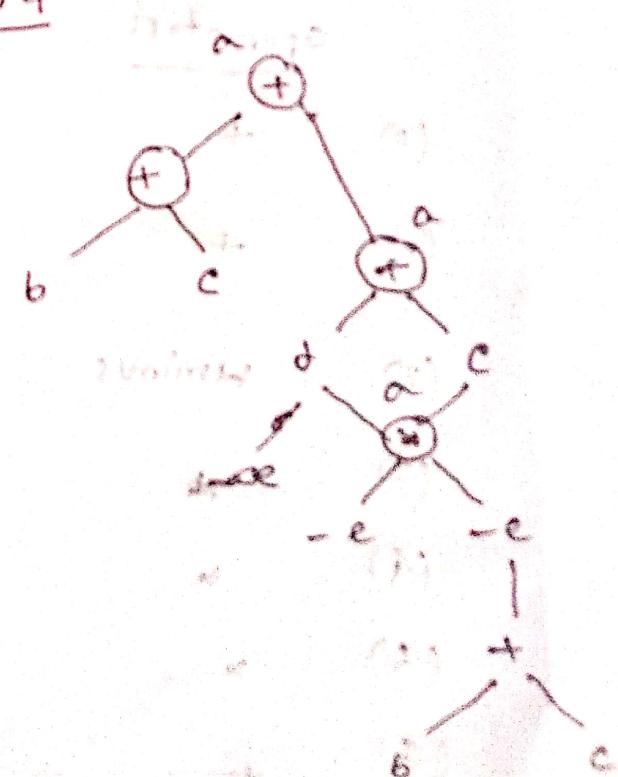


s-03:

s-03:



s-04:



E 17101086

c)

$$a := (b+c) + (d+e) = (-e) \times (-e) \times (b+c)$$

Three address code:

$$+1 = d + e$$

$$+2 = b + c$$

$$+3 = -e$$

$$+4 = +3$$

$$+5 = +3 \times +4$$

$$+6 = +5 \times +5$$

$$+7 = +2 + +6$$

$$a := +2$$

### Quadruples

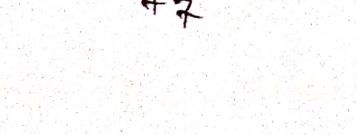
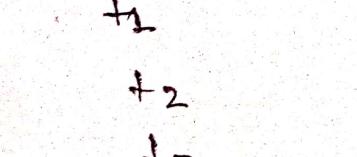
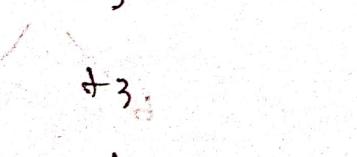
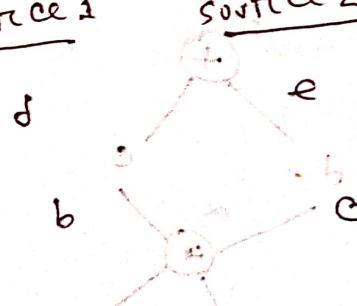
operator

- (0) +
- (1) -
- (2) \*minus
- (3) \*
- (4) \*
- (5) \*
- (6) +
- (7) :=

P-04 SOURCE 1

P-04 SOURCE 2

result



triplesoperatorsource 1source 2

(0)  $a + b \rightarrow c$

d

c

(1)  $a + b = c$

b

c

(2)  $a - b \rightarrow c$

e

(3)  $a * b \rightarrow c$

(2)

(4)  $a / b \rightarrow c$

(2)

(5)  $a \% b \rightarrow c$

(0)

(6)  $a + b = c$

(4)

(7)  $a - b = c$

(1)

(8)  $a * b = c$

(6)

(9)  $a / b = c$

(0)

(10)  $a \% b = c$

(2)

(11)  $a + b = c$

(2)

(12)  $a - b = c$

(2)

(13)  $a * b = c$

(2)

(14)  $a / b = c$

(2)

(15)  $a \% b = c$

(2)

(16)  $a + b = c$

(2)

(17)  $a - b = c$

(2)

(18)  $a * b = c$

(2)

(19)  $a / b = c$

(2)

(20)  $a \% b = c$

(2)

Ans: to the Q: no - 02

$$1) i = 0$$

$$2) \text{ if } i >= n \text{ goto (18)}$$

$$3) j = 0$$

$$4) \text{ if } j >= n \text{ goto (11)}$$

$$5) t_1 = n * i$$

$$6) t_2 = t_1 + j$$

$$7) t_3 = t_2 * 8$$

$$8) C[t_3] = 0.0$$

$$9) j = j + 1$$

$$10) \text{ goto (9)}$$

$$11) i = i + 1$$

$$12) \text{ goto (2)}$$

$$13) k = 0$$

$$14) t_4 = t_1 + 2^0$$

$$15) t_2 = t_1 * 5$$

$$16) t_3 = t_2 - 2$$

$$17) C[t_2] = 25$$

$$18) \text{ if } i >= n \text{ goto (99)}$$

$$19) j = 0$$

$$20) \text{ if } j >= n \text{ goto (92)}$$

$$21) k = 0$$

$$22) i > n \text{ goto (90)}$$

$$23) t_5 = t_9 + j$$

$$24) t_6 = t_5 * 8$$

$$25) t_7 = c[k+t_6]$$

$$26) t_8 = n * i$$

$$27) t_9 = t_8 + k$$

$$28) t_{10} = t_9 * 8$$

$$29) t_{11} = a[t_{10}]$$

$$30) t_{12} = n * i$$

$$31) t_{13} = t_{12} + j$$

$$32) t_{14} = t_{13} * 8$$

$$33) t_{15} = b[t_{14}]$$

$$34) t_{16} = t_{11} * t_{15}$$

$$35) t_{17} = t_7 + t_{16}$$

$$36) C[t_6] = t_{17}$$

$$37) k = k + 1$$

$$38) \text{ goto (22)}$$

$$39) j = j + 1$$

$$40) \text{ goto (20)}$$

$$41)$$

$$42)$$

i) set of leaders:

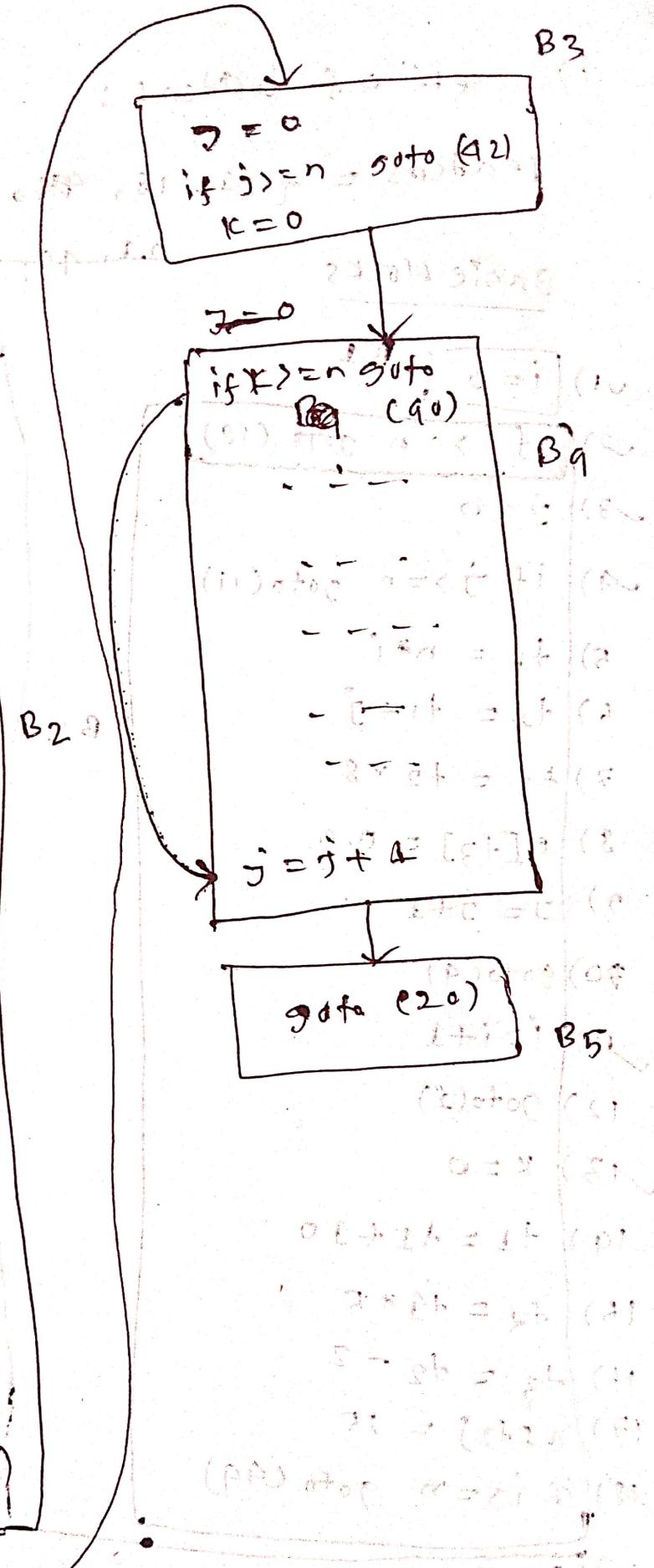
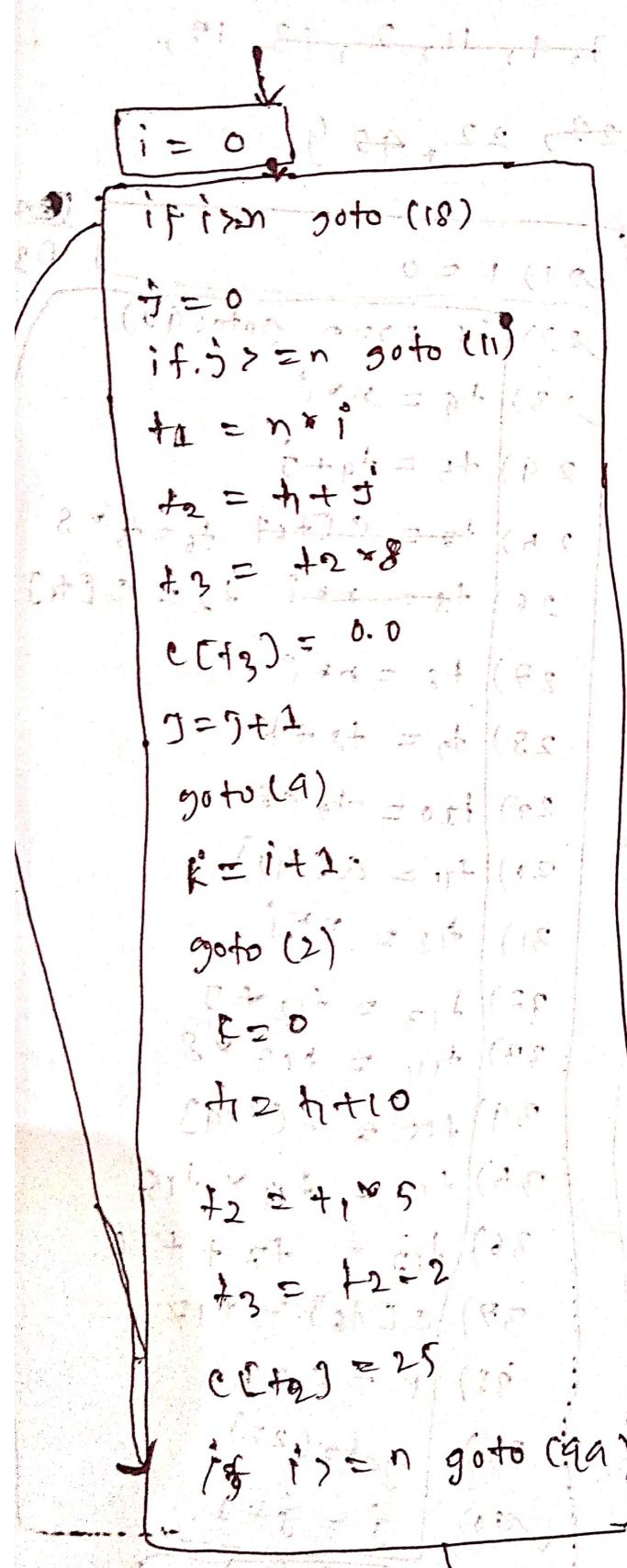
$$\text{Leaders} = \{ 1, 18, 4, 3, 4, 11, 2, 13, 19, \\ 22, 40, 23, 22, 40 \}$$

### Basic blocks

✓ 1)  $i = 0$  B1  
 ✓ 2) if  $i >= n$  goto (18)  
 ✓ 3)  $j = 0$   
 ✓ 4) if  $j >= n$  goto (11)  
 ✓ 5)  $t_1 = n^2 i$   
 ✓ 6)  $t_2 = t_1 + j$   
 ✓ 7)  $t_3 = t_2 * 8$   
 ✓ 8)  $c[t_3] = 0.0$   
 ✓ 9)  $j = j + 1$   
 ✓ 10) goto (9), B2  
 ✓ 11)  $i = i + 1$   
 ✓ 12) goto (2)  
 ✓ 13)  $K = 0$   
 ✓ 14)  $t_1 = t_1 + 10$   
 ✓ 15)  $t_2 = t_1 * 5$   
 ✓ 16)  $t_3 = t_2 - 2$   
 ✓ 17)  $c[t_2] = 25$   
 ✓ 18) if  $i >= n$  goto (99)  
 ✓ 19)  $j = 0$   
 ✓ 20) if  $j >= n$  goto (92)

✓ 1)  $K = 0$  B3  
 ✓ 2) if  $K = n$  goto (40)  
 ✓ 3)  $t_4 = n^2 i$   
 ✓ 4)  $t_5 = t_4 + j$   
 ✓ 5)  $t_7 = c[t_4] + t_5 * 8$   
 ✓ 6)  $t_8 = n^2 i$  B4  
 ✓ 7)  $t_8 = n^2 i$   
 ✓ 8)  $t_9 = t_8 + K$   
 ✓ 9)  $t_{10} = -t_9 * 8$   
 ✓ 10)  $t_{11} = a[t_9]$   
 ✓ 11)  $t_{12} = n^2 i$   
 ✓ 12)  $t_{13} = t_{12} + j$   
 ✓ 13)  $t_{14} = t_{13} * 8$   
 ✓ 14)  $t_{15} = b[c[t_9]]$   
 ✓ 15)  $t_{16} = t_{11} * t_{15}$   
 ✓ 16)  $t_{17} = t_7 + t_{16}$   
 ✓ 17)  $c[t_8] = t_{17}$   
 ✓ 18)  $K = K + 1$   
 ✓ 19) goto (22)  
 ✓ 20)  $j = j + 2$   
 ✓ 21) goto (20) B5

ii) follow graph



17101086

Ans. to the Q: No - 03

stack	Input	Moves
\$	((id+id)*id)+id	$E \rightarrow TE'$
\$ E T' id	((id+id)*id)+id	$T \rightarrow FT'$
\$ T' f	((id+id)*id)+id	$F \rightarrow (E)$
\$ ) E C	((id+id)*id)+id	POP ')' C'
\$ ) E	((id+id)*id)+id	$E \rightarrow TE'$
\$ ) E' T	((id+id)*id)+id	$T \rightarrow FT'$
\$ ) E' T' F	((id+id)*id)+id	$F \rightarrow (E)$
\$ ) E' T ) E C	((id+id)*id)+id	POP ')' C'
\$ ) E' T ) E	((id+id)*id)+id	$E \rightarrow TE'$
\$ ) E' T ) E' T	((id+id)*id)+id	POP T $\rightarrow FT'$
\$ ) E' T ) E' T	((id+id)*id)+id	$F \rightarrow id$
\$ ) E' T ) E' T	((id+id)*id)+id	$T' \rightarrow \omega$
\$ ) E' T ) E' T	((id+id)*id)+id	$T \rightarrow FT'$
\$ ) E' T ) E' T	((id+id)*id)+id	$F \rightarrow id$

NOW, always we ~~are~~<sup>NO</sup> If we put the (A) production rules type is always comes the  $T \rightarrow E$  or it.

for that the whole process will be repeated

for the stack position like  $\$)E'T)EC$ .

for that we cannot generate the given string.

But the passing will be held for string  $E^*$

$E^*$  and 'id'

$6i + (6i^*(6i+6i))$

Ans: to the Q: no - 9(b)

Ques,

stmt	=	E
list	=	L
e =	=	e
s =	=	s

a)

$$S \rightarrow Y \mid Y S$$

$$Y \rightarrow X \mid T$$

$$X \rightarrow X$$

Simplified augmented grammars

$$S' \rightarrow \cdot S$$

$$S \rightarrow \cdot Y$$

$$S \rightarrow \cdot Y S$$

$$Y \rightarrow \cdot X$$

$$X \rightarrow \cdot X$$

S-2: Calculation of first set,

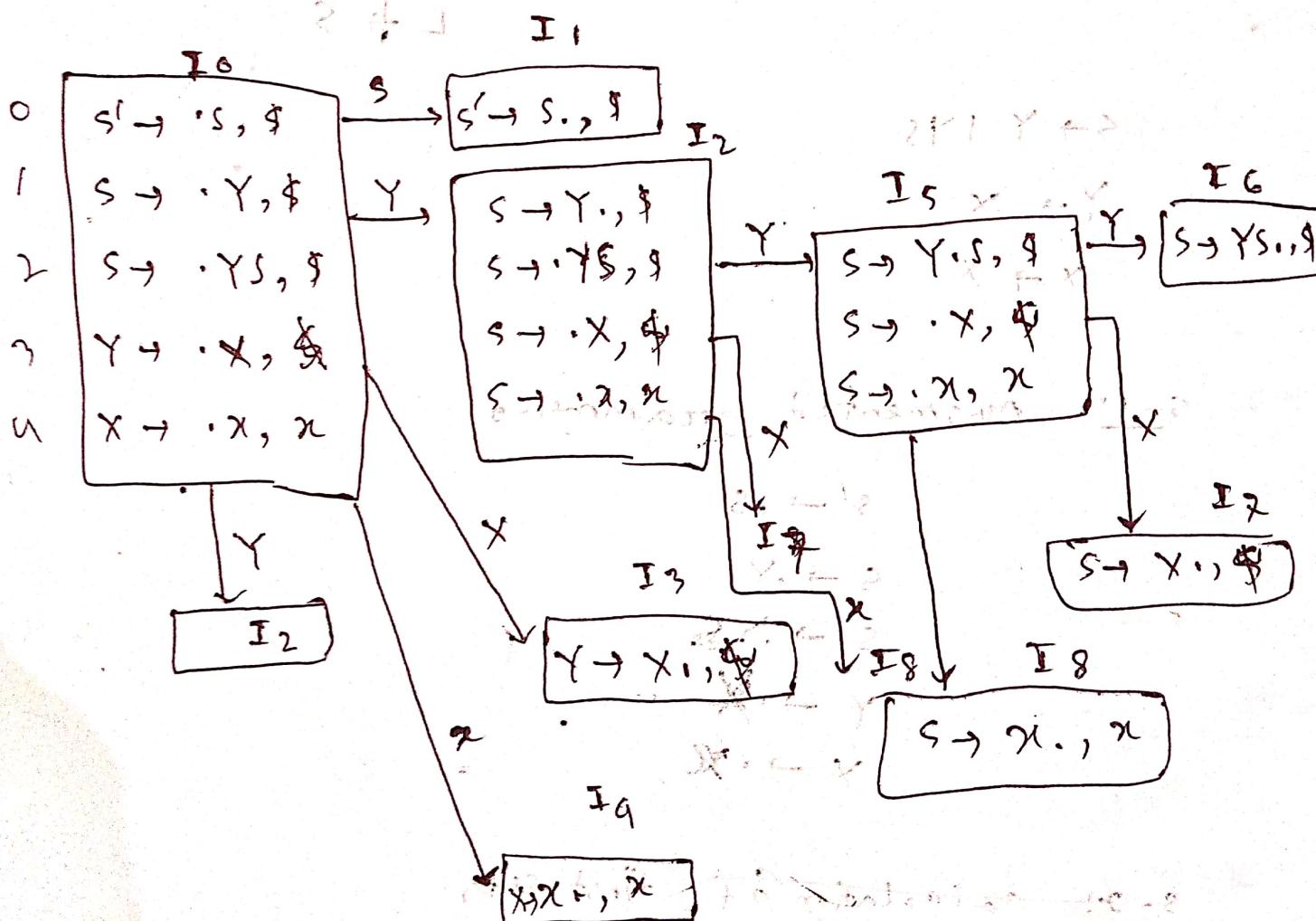
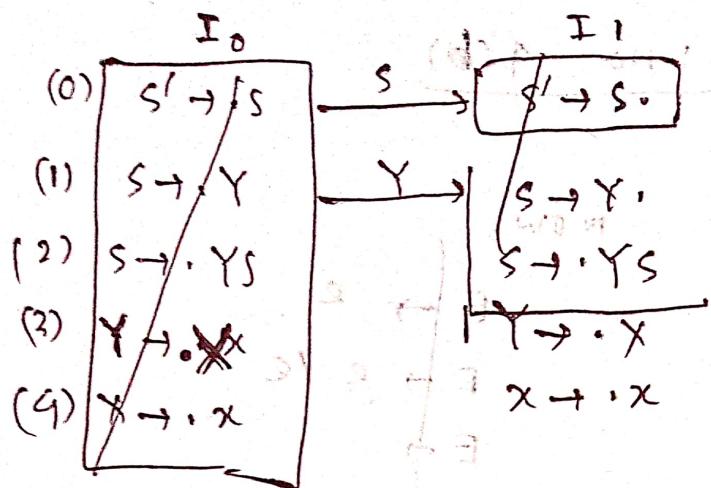
$$\text{First}(X) = \{x\}$$

$$\text{First}(Y) = \{xy\}$$

$$\text{First}(S) = \{w\}$$

117101086

P-12



State	Action	$r_1$	$s$	$r_2$	$t$
$I_0$	$r_9$	$x$	$f$	$1$	$x$
$I_1$	accept			$t$	
$I_2$	$r_8$	$x$	$p_1$	$s$	$x$
$I_3$	$r_7$	$x$	$p_3$	$t$	
$I_4$			$r_9$	$6$	$x$
$I_5$				$6$	$x$
$I_6$			$r_2$		
$I_7$			$r_3$		
$I_8$	$r_9$				

so, there is no multiple contrain. for that it is

LR(1) PARSER

17101086

b)

~~Two conflicts:~~

1. we have to generate the lookahead and for reduce we have to put it.
2. Then at first we have to generate the first set for that calculate the lookahead.

With help of various algorithm or in simple words  
top-down approach