

Cse 231 (Digital Logic Design)

Group Project: EID – 2021

Group members :

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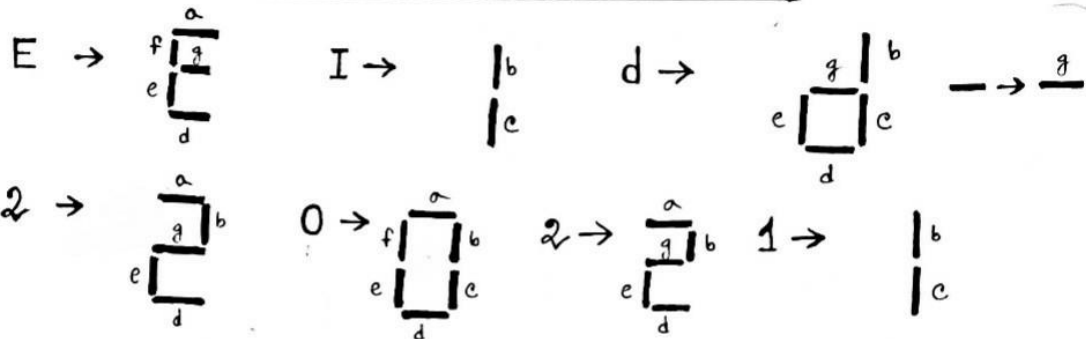
Submitted to:

Dr Mohammad Monirujjaman Khan (KMM)

Date: 27.04.2021

Using (POS) by Latifa :

Project : Eid - 2021



Truth Table :

Words and Decimal numbers	Inputs			Outputs						
	A	B	C	a	b	c	d	e	f	g
E	0	0	0	1	0	0	1	1	1	1
I	0	0	1	0	1	1	0	0	0	0
d	0	1	0	0	1	1	1	1	0	1
-	0	1	1	0	0	0	0	0	0	1
2	1	0	0	1	1	0	1	1	0	1
0	1	0	1	1	1	1	1	1	1	0
2	1	1	0	1	1	0	1	1	0	1
1	1	1	1	0	1	1	0	0	0	0

The POS Equations :

$$a : (A+B+\bar{C})(A+\bar{B}+C)(A+\bar{B}+\bar{C})(\bar{A}+\bar{B}+\bar{C})$$

$$b : (A+B+C)(A+\bar{B}+\bar{C})$$

$$c : (A+B+C)(A+\bar{B}+\bar{C})(\bar{A}+B+C)(\bar{A}+\bar{B}+C)$$

$$d : (A+B+\bar{C})(A+\bar{B}+\bar{C})(\bar{A}+\bar{B}+\bar{C})$$

$$e : (A+B+\bar{C})(A+\bar{B}+\bar{C})(\bar{A}+\bar{B}+\bar{C})$$

$$f : (A+B+\bar{C})(A+\bar{B}+C)(A+\bar{B}+\bar{C})(\bar{A}+B+C)(\bar{A}+\bar{B}+C)(\bar{A}+\bar{B}+\bar{C})$$

$$g : (A+B+\bar{C})(\bar{A}+B+\bar{C})(\bar{A}+\bar{B}+\bar{C})$$

for segment a:

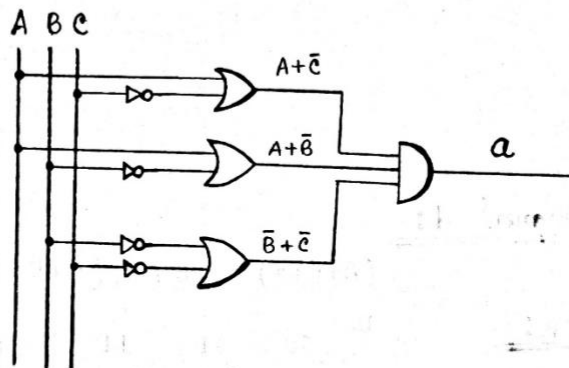
$$(A+B+\bar{c})(A+\bar{b}+c)(A+\bar{b}+\bar{c})(\bar{A}+\bar{b}+\bar{c})$$

K-map:

A \ BC	00	01	11	10
	0	1	1	0
0	1	0	0	0
1	1	1	0	1

$$\therefore a = (A+\bar{c})(A+\bar{b})(\bar{b}+\bar{c})$$

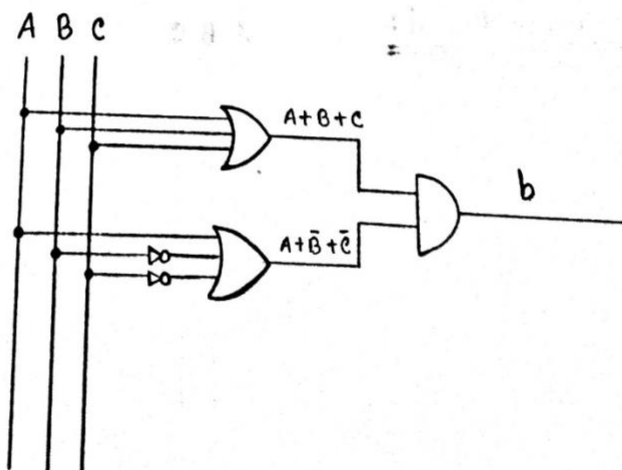
Logic circuit for a:



for segment b:

$$(A+B+c)(A+\bar{b}+\bar{c})$$

Logic circuit for b:



for segment c:

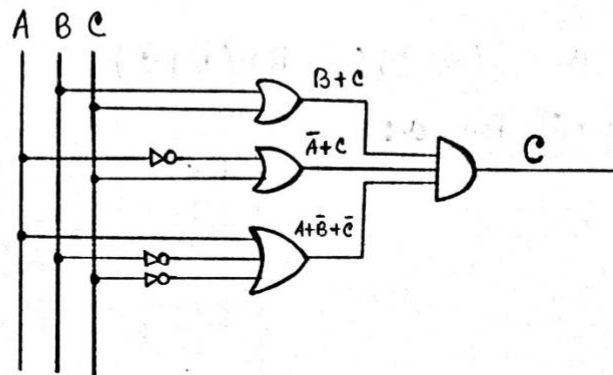
$$(A+B+c)(A+\bar{B}+\bar{c})(\bar{A}+B+c)(\bar{A}+\bar{B}+c)$$

K-map:

A \ BC	00	01	11	10
	0	1	0	1
0	0	1	0	1
1	0	1	1	0

$$\therefore c = (B+c)(\bar{A}+c)(A+\bar{B}+\bar{c})$$

Logic circuit for c:



for segment d:

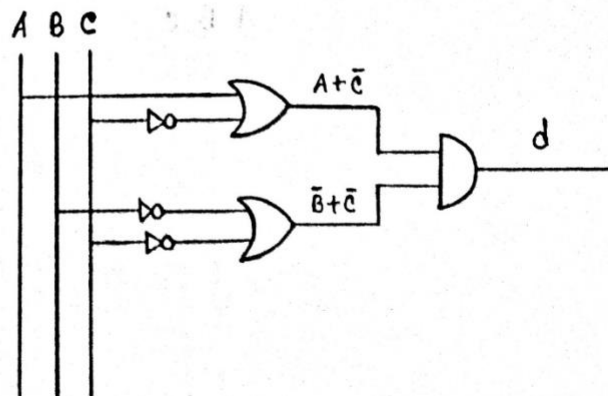
$$(A+B+\bar{c})(A+\bar{B}+\bar{c})(\bar{A}+\bar{B}+\bar{c})$$

K-map:

A \ BC	00	01	11	10
	0	1	0	1
0	1	0	0	1
1	1	1	0	1

$$\therefore d = (A+\bar{c})(\bar{B}+\bar{c})$$

Logic circuit for d:



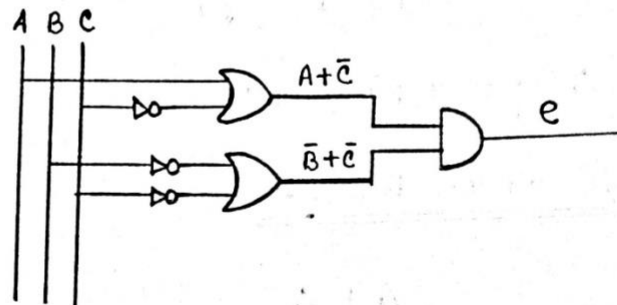
for segment e: $(A+B+\bar{C})(A+\bar{B}+\bar{C})(\bar{A}+\bar{B}+\bar{C})$

K-map:

A \ BC	00	01	11	10
0	1	0	0	1
1	1	1	0	1

$$\therefore e = (A+\bar{C})(\bar{B}+\bar{C})$$

Logic circuit for e:



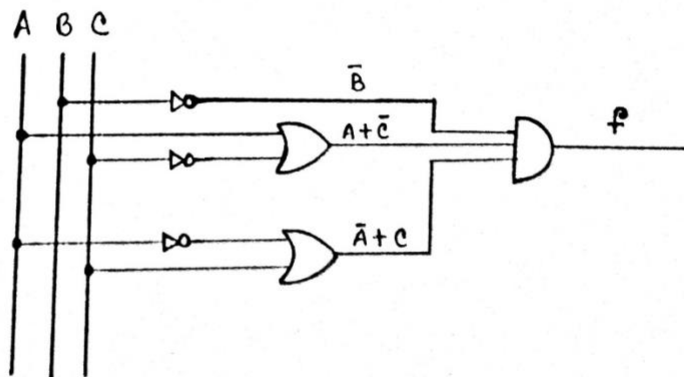
for segment f:

$$(A+B+\bar{C})(A+\bar{B}+C)(A+\bar{B}+\bar{C})(\bar{A}+B+C)(\bar{A}+\bar{B}+C)(\bar{A}+\bar{B}+\bar{C})$$

A \ BC	00	01	11	10
0	1	0	0	0
1	0	1	0	0

$$\therefore f = \bar{B} \cdot (A+\bar{C}) \cdot (\bar{A}+C)$$

Logic circuit for f:



for segment g:

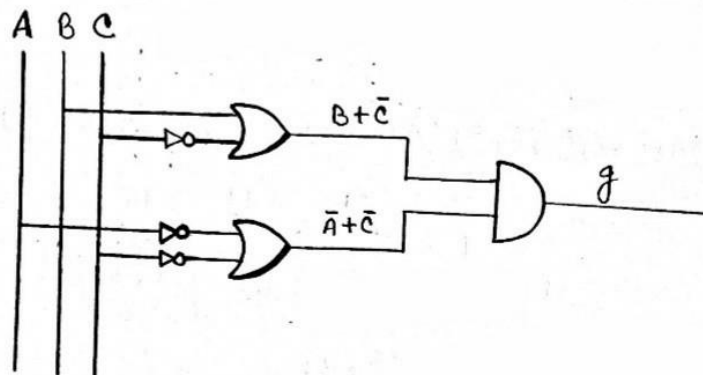
$$(A+B+\bar{C})(\bar{A}+B+\bar{C})(\bar{A}+\bar{B}+\bar{C})$$

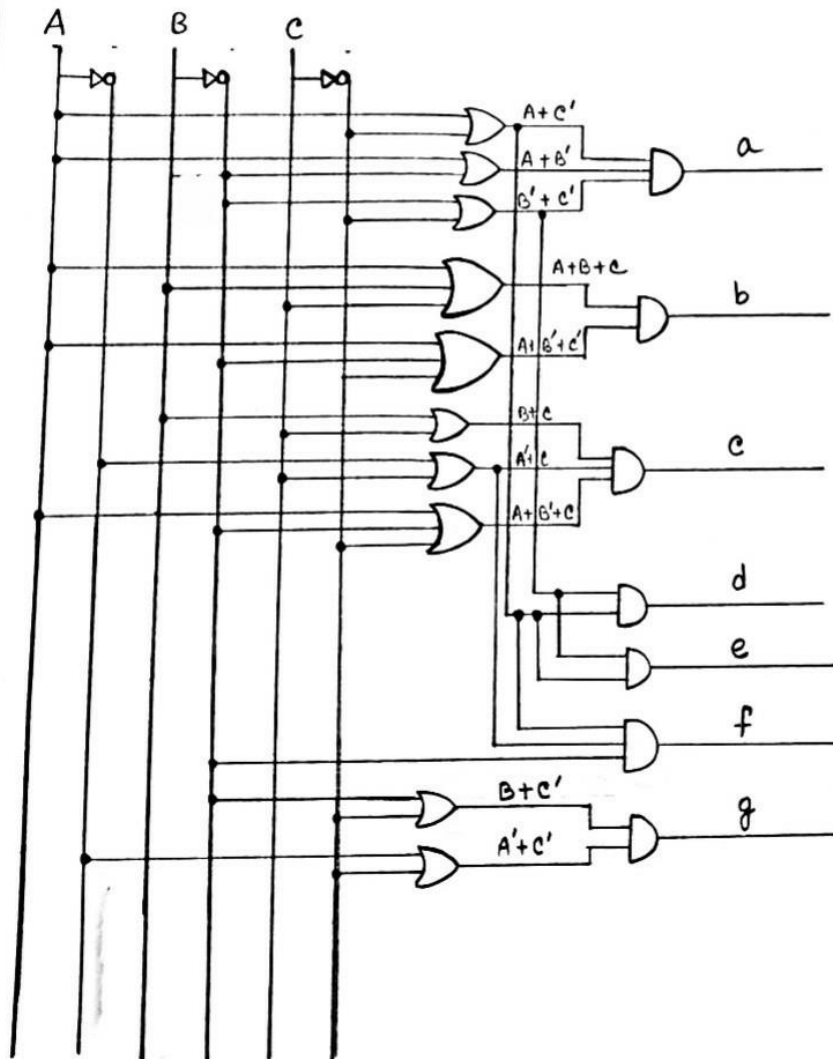
K-map:

A \ BC	00	01	11	10
0	1	0	1	1
1	1	0	0	1

$$\therefore g = (B+\bar{C})(\bar{A}+\bar{C})$$

Logic circuit for g:





Project figure : The seven segment Decoder circuit
for Eid - 2021

Using (SOP) by Arman:

Project Name : EID-2021 (Display by seven segment decoder).

Decimal	BCD inputs			Outputs						
Numbers	A	B	C	a	b	c	d	e	f	g
0	0	0	0	1	0	0	1	1	1	1
1	0	0	1	0	0	0	0	1	1	0
2	0	1	0	0	1	1	1	1	0	1
3	0	1	1	0	0	0	0	0	0	1
4	1	0	0	1	1	0	1	1	0	1
5	1	0	1	1	1	1	1	1	1	0
6	1	1	0	1	1	0	1	1	0	1
7	1	1	1	0	1	1	0	0	0	0

Equations :

$$a = \bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C} + A\bar{B}C + AB\bar{C}$$

$$b = \bar{A}B\bar{C} + A\bar{B}\bar{C} + A\bar{B}C + AB\bar{C} + ABC$$

$$c = \bar{A}B\bar{C} + A\bar{B}C + ABC$$

$$d = \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + A\bar{B}C + AB\bar{C}$$

$$e = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + AB\bar{C} + AB\bar{C}$$

$$f = \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}C$$

$$g = \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + AB\bar{C}$$

K-map for segment a,

	BC		B	
A \	00	01	11	10
0	1	0	0	0
1	1	1	0	1

∴ Logic for segment a = $\bar{B}\bar{C} + A\bar{B} + A\bar{C}$

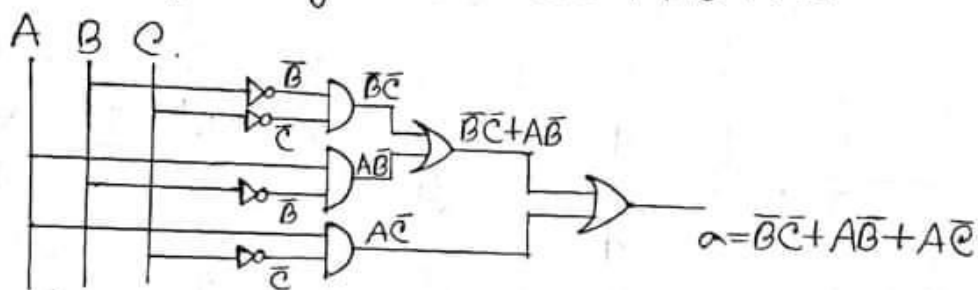


Figure : Logic circuit for segment a.

K-map for segment b,

	BC		B	
A \	00	01	11	10
0	0	0	0	1
1	1	1	1	1

∴ Logic for segment b = $B\bar{C} + A$

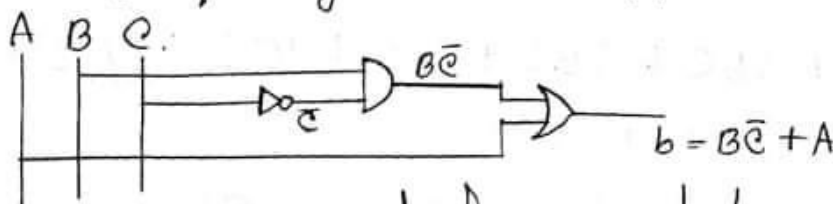


Figure : Logic circuit for segment b.

k-map for segment c,

	B			
A \ BC	00	01	11	10
0	0	0	0	1
1	0	1	1	0

\therefore Logic for segment c = $\bar{A}\bar{B}\bar{C} + AC$.

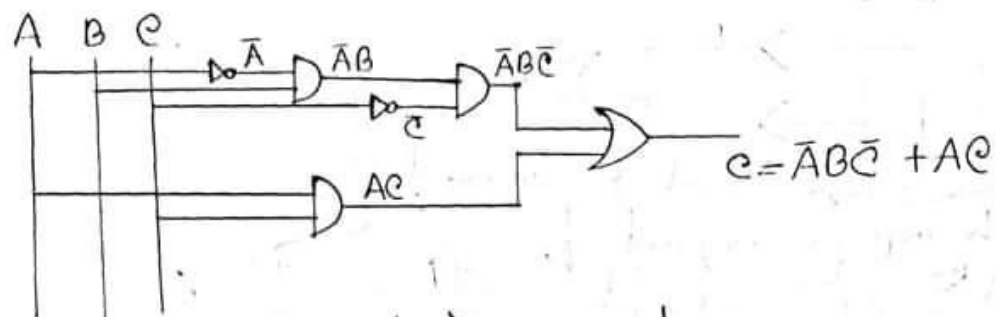


Figure : Logic circuit for segment c.

k-map for segment d,

	B			
A \ BC	00	01	11	10
0	1	0	0	1
1	1	1	0	1

\therefore Logic for segment d = $\bar{C} + A\bar{B}$

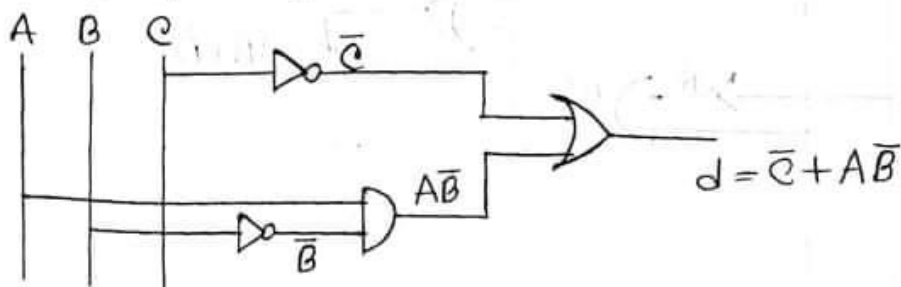


Figure : Logic circuit for segment d.

K-map for segment e,

	BC		B	
	00	01	11	10
A 0	1	1	0	1
A 1	1	1	0	1

\therefore Logic for segment e = $\bar{B} + \bar{C}$

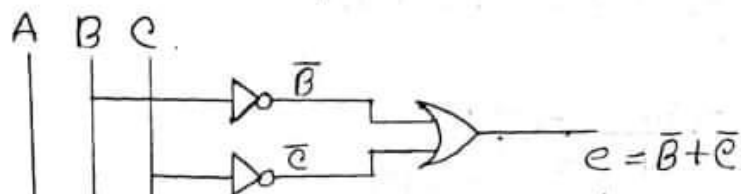


Figure : Logic circuit for segment e.

K-map for segment f,

	BC		B	
	00	01	11	10
A 0	1	1	0	0
A 1	0	1	0	0

\therefore Logic for segment f = $\bar{A}\bar{B} + \bar{B}C$

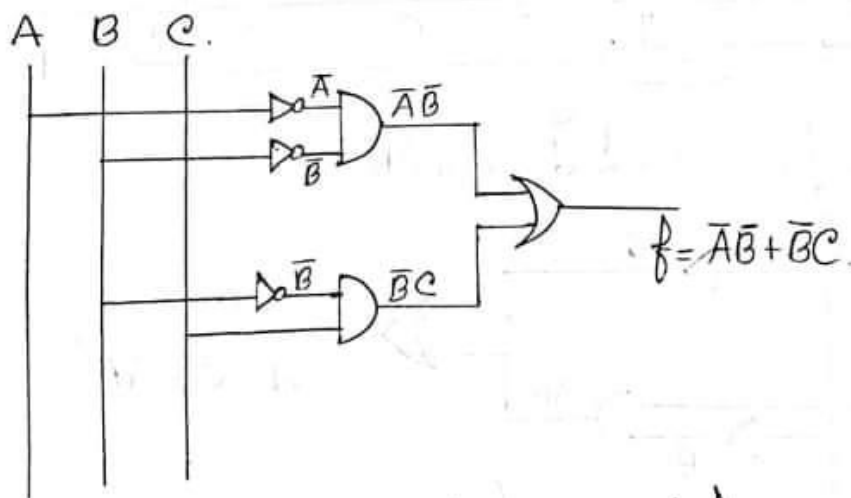


Figure : Logic circuit for segment f.

k-map for segment g,

	00		01	11	10
A \ BC	0	1	3	2	
0	1	0	1	1	
1	1	0	0	0	1
					6

\therefore Logic for segment g = $\bar{C} + \bar{A}B$.

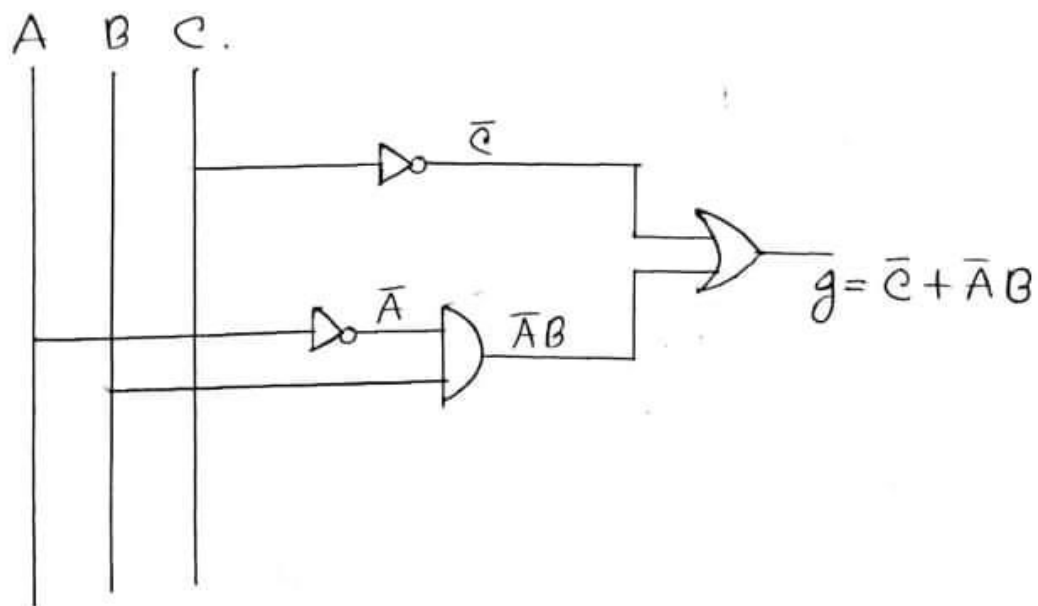


Figure : Logic circuit for segment g.

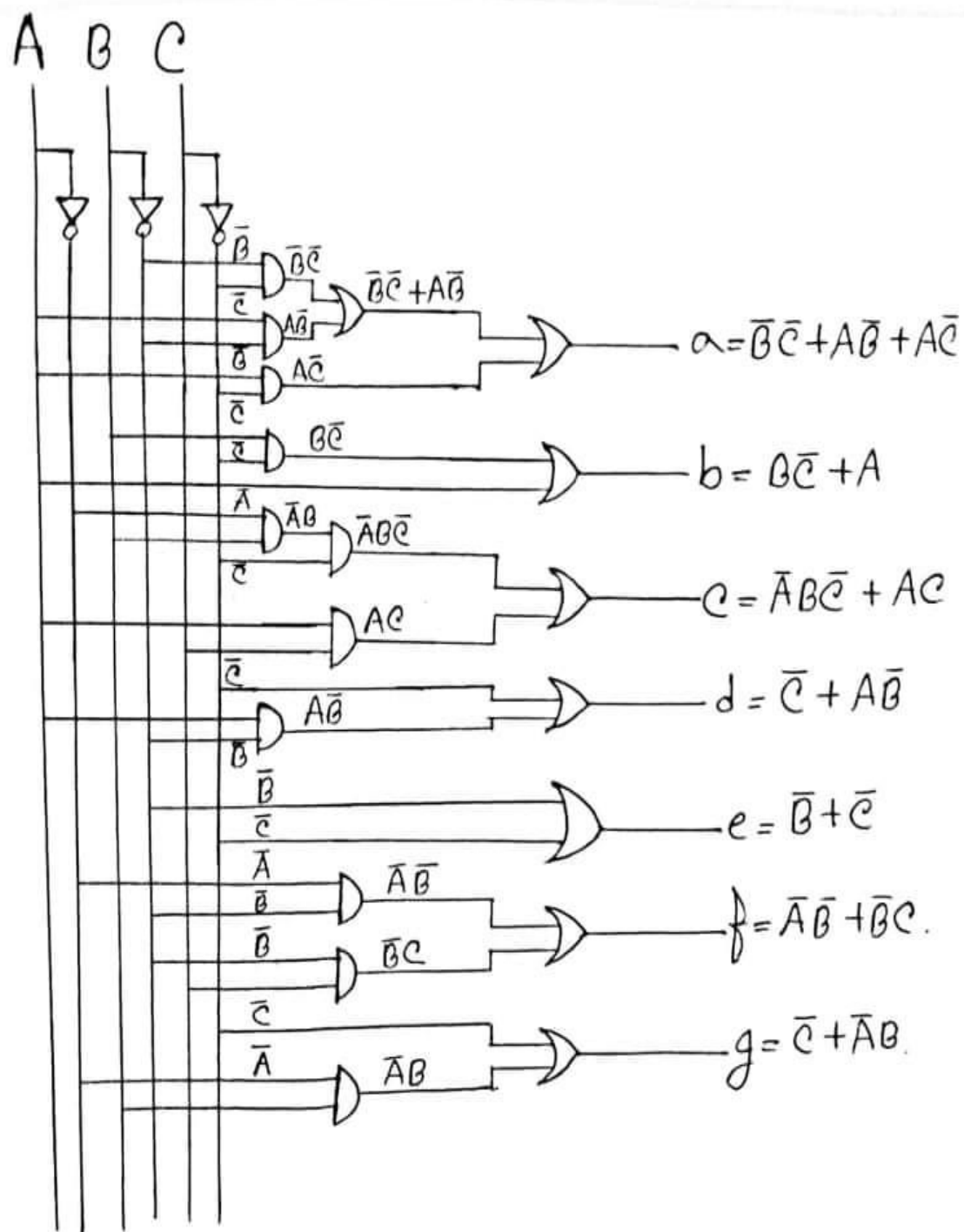


Figure: The Seven Segment Decoder circuit for

EID-2021.

Using (SOP -NAND) by Ariful:

K-map

K map for segment a

A \ B C	00	01	11	10
	0	1	3	2
0	1	0	0	0
1	1	1	0	1

K-map for segment b.

A \ B C	00	01	11	10
	0	1	3	2
0	0	0	0	1
1	1	1	1	1

K-map for segment c

A \ B C	00	01	11	10
	0	1	3	2
0	0	0	0	1
1	0	1	1	0

k-map for segment d

		B			
		00	01	11	10
A	0	0	1	0	0
	1	1	1	0	1

Groupings: (0,1), (1,5), (4,5), (2,3), (6,7)

k-map for segment e

		B			
		00	01	11	10
A	0	0	1	0	1
	1	1	1	0	1

Groupings: (0,1), (1,5), (4,5), (2,3), (6,7)

k-map for segment f

		B			
		00	01	11	10
A	0	0	1	0	0
	1	0	1	0	0

Groupings: (0,1), (1,5), (4,5)

k-map for segment g

		B			
		00	01	11	10
A	0	0	1	0	0
	1	1	0	0	1

Groupings: (0,1), (1,5), (4,5), (2,3), (6,7)

∴ Logic for segment a = $\overline{B}\overline{C} + A\overline{B} + A\overline{C}$

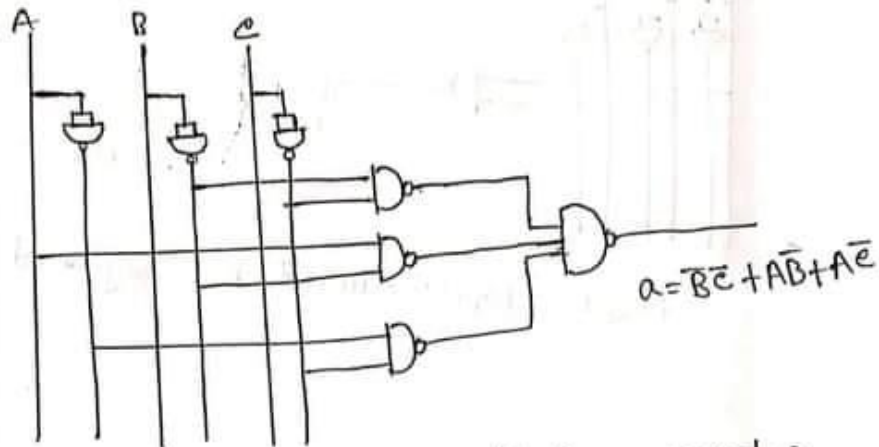


Figure: Logic circuit for segment a

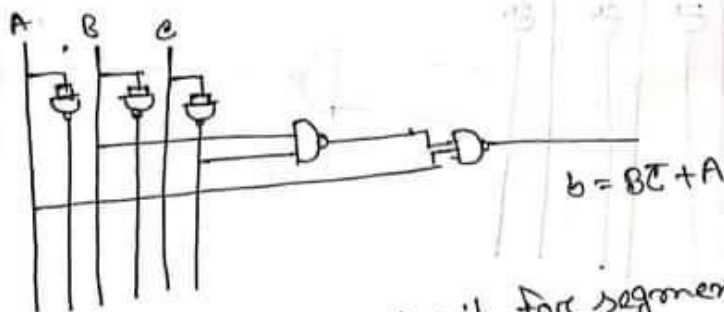


Figure: Logic circuit for segment b

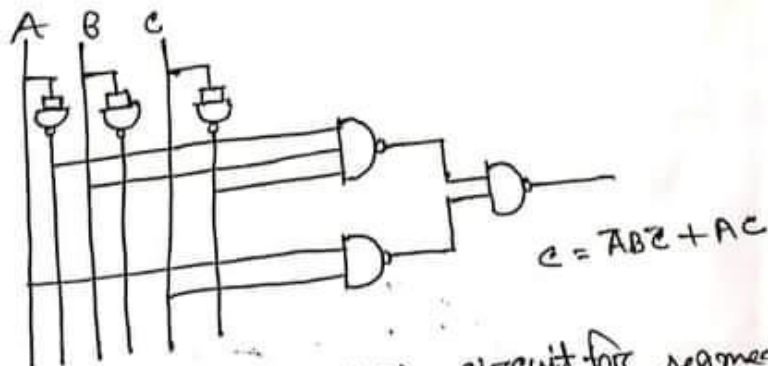


Figure: Logic circuit for segment c

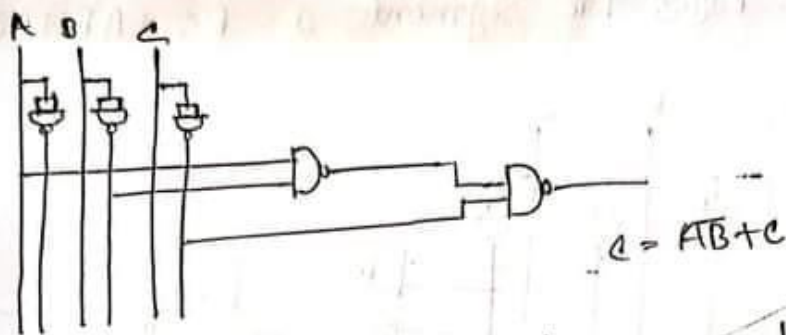


Figure: Logic circuit for segment d

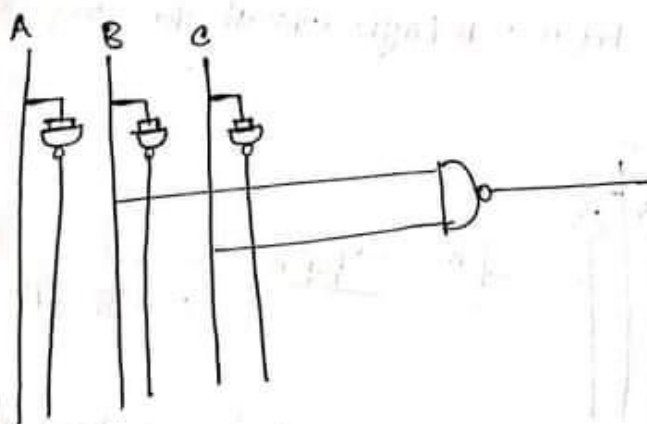


Figure: Logic circuit for segment e

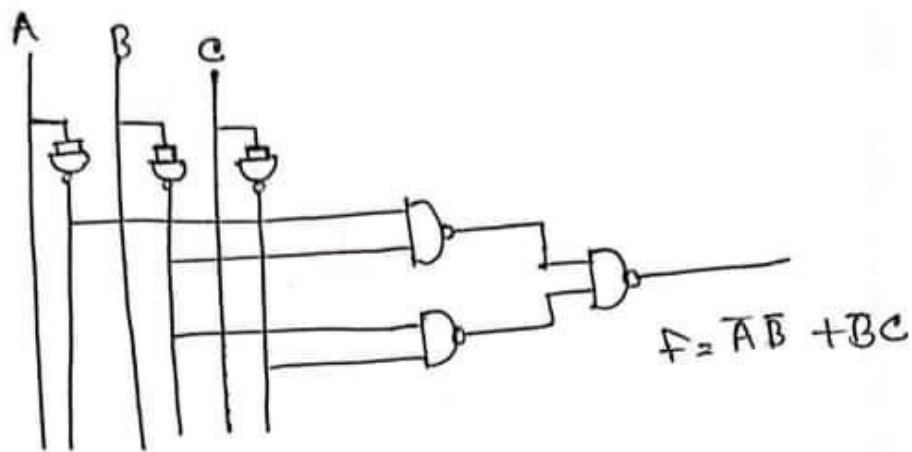


Figure: Logic circuit for segment f

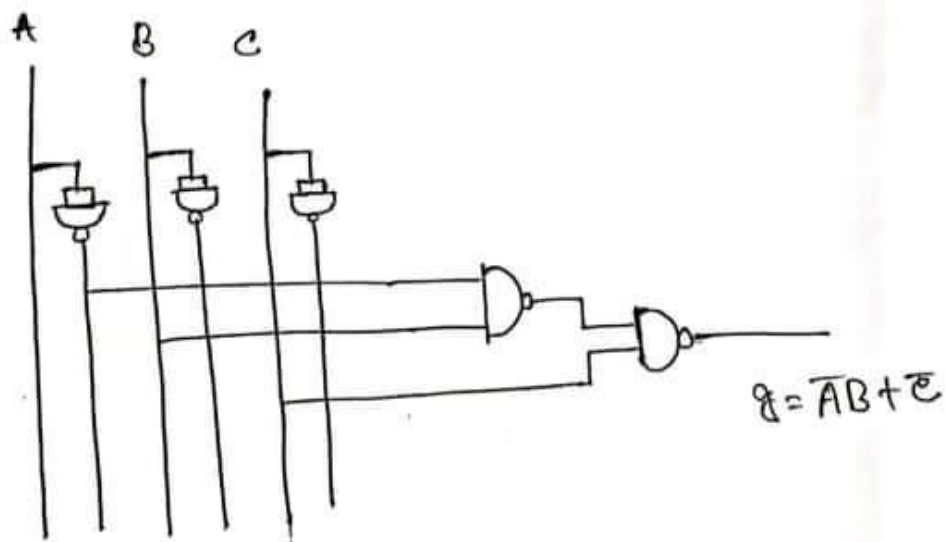


Figure: Logic circuit for segment g

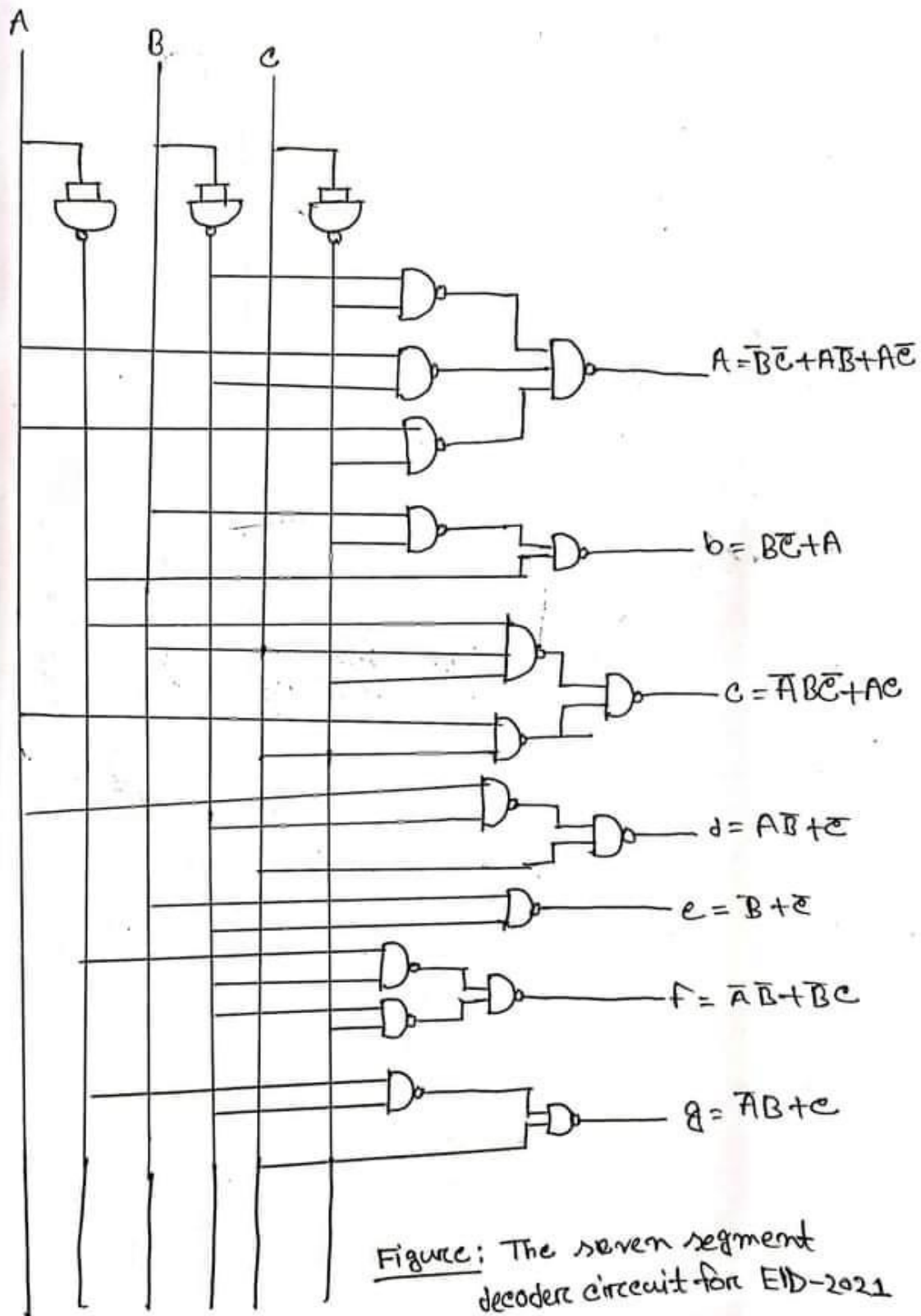


Figure: The seven segment decoder circuit for EID-2021

Using (SOP – NOR) by Raiyan:

k-map for segment a

	BC	00	01	11	10
A	0	1	0	0	0
1	1	1	1	0	1

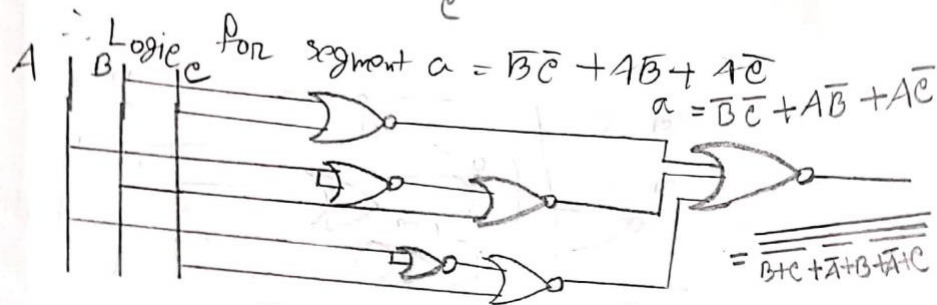


Figure: Logic circuit for segment a

k-map for segment b

	BC	00	01	11	10
A	0	0	0	0	1
1	1	1	1	1	1

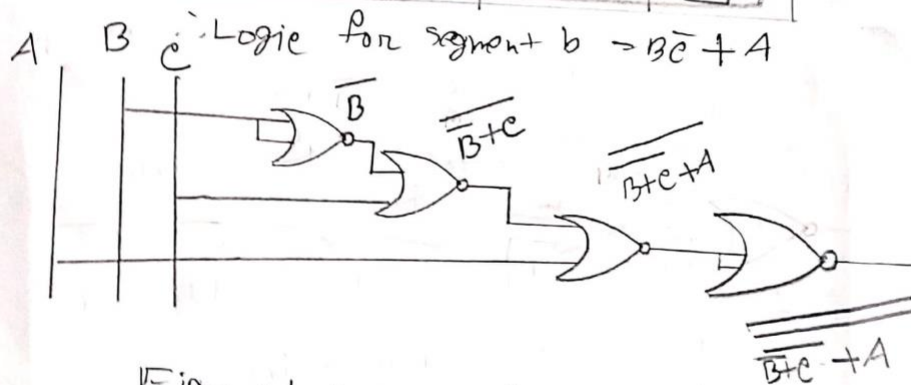


Figure: Logic circuit for segment b

K-map segment for c

	BC	00	01	11	10
A	0	0	0	0	1
1	1	0	1	1	0

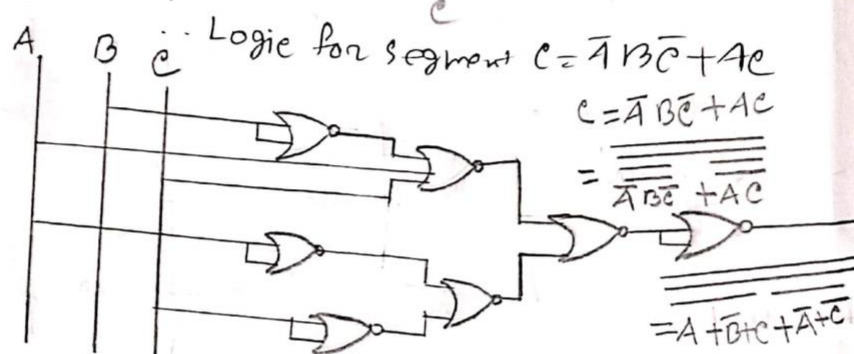


Figure: Logic circuit for segment c

K-map segment d

	BC	00	01	11	10
A	0	1		0	1
1	1	1	1	0	1

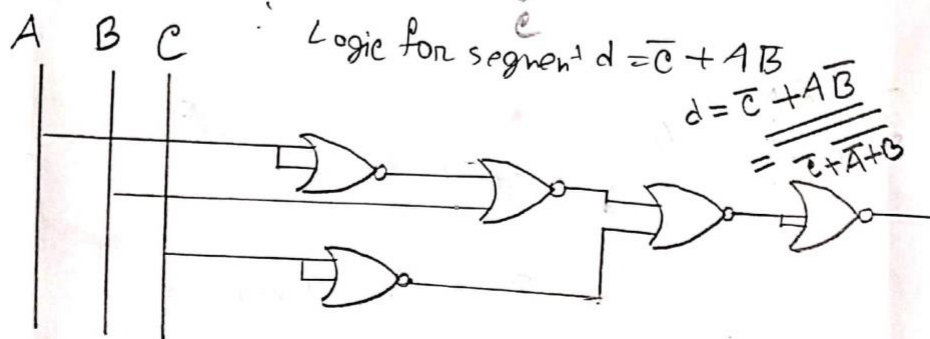


Figure: Logic circuit for segment d

K-map segment e,

	BC	00	01	11	10
A	0	1	1	0	1
1	1	1	1	0	1

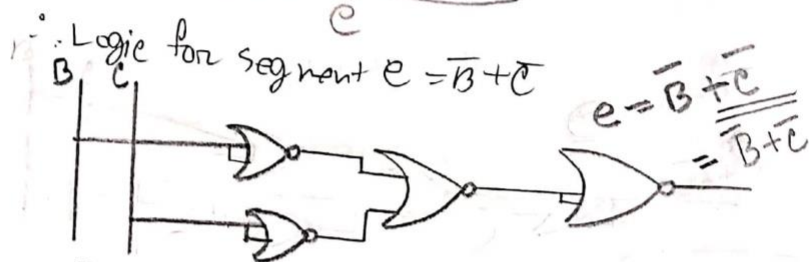


Figure: Logic circuit for segment e = $\bar{B} + \bar{C}$

K-map for segment f,

	BC	00	01	11	10
A	0	1	1	0	0
1	1	1	1	0	0

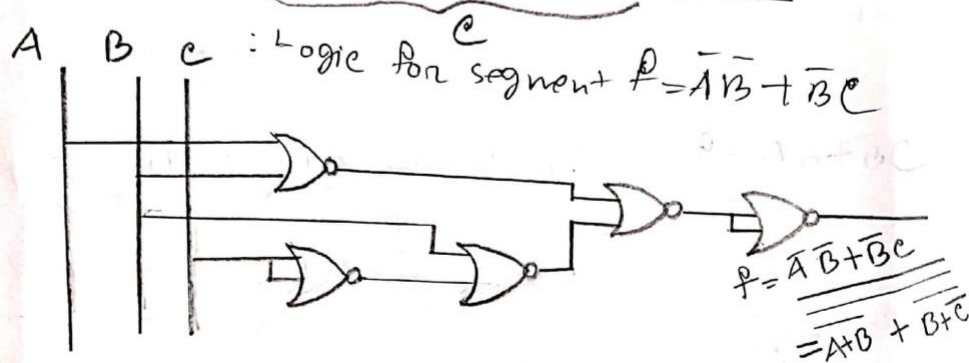


Figure: Logic circuit for segment f

K-map for segment g,

	BC	00	01	11	10
A	0	1	0	1	1
A	1	1	0	0	1

Logic for segment g = $\bar{C} + \bar{A}B$

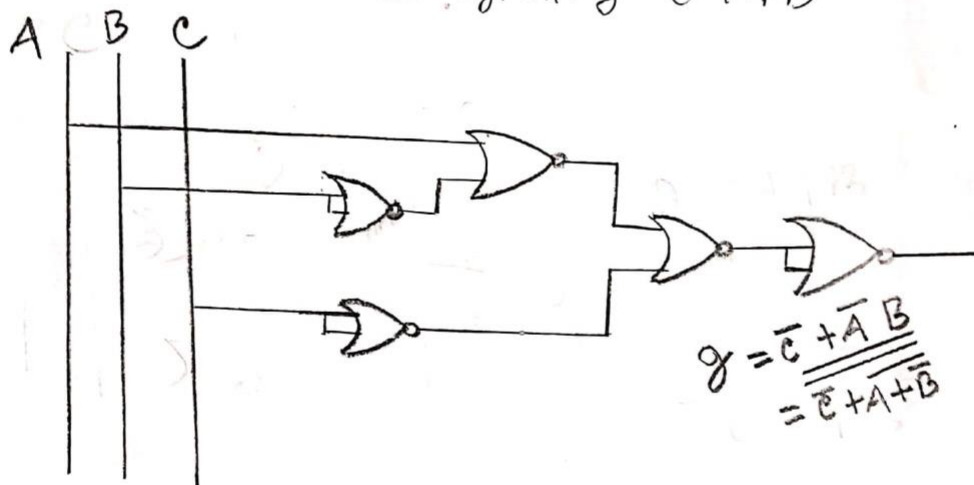


Figure: Logic circuit for segment g

A B C

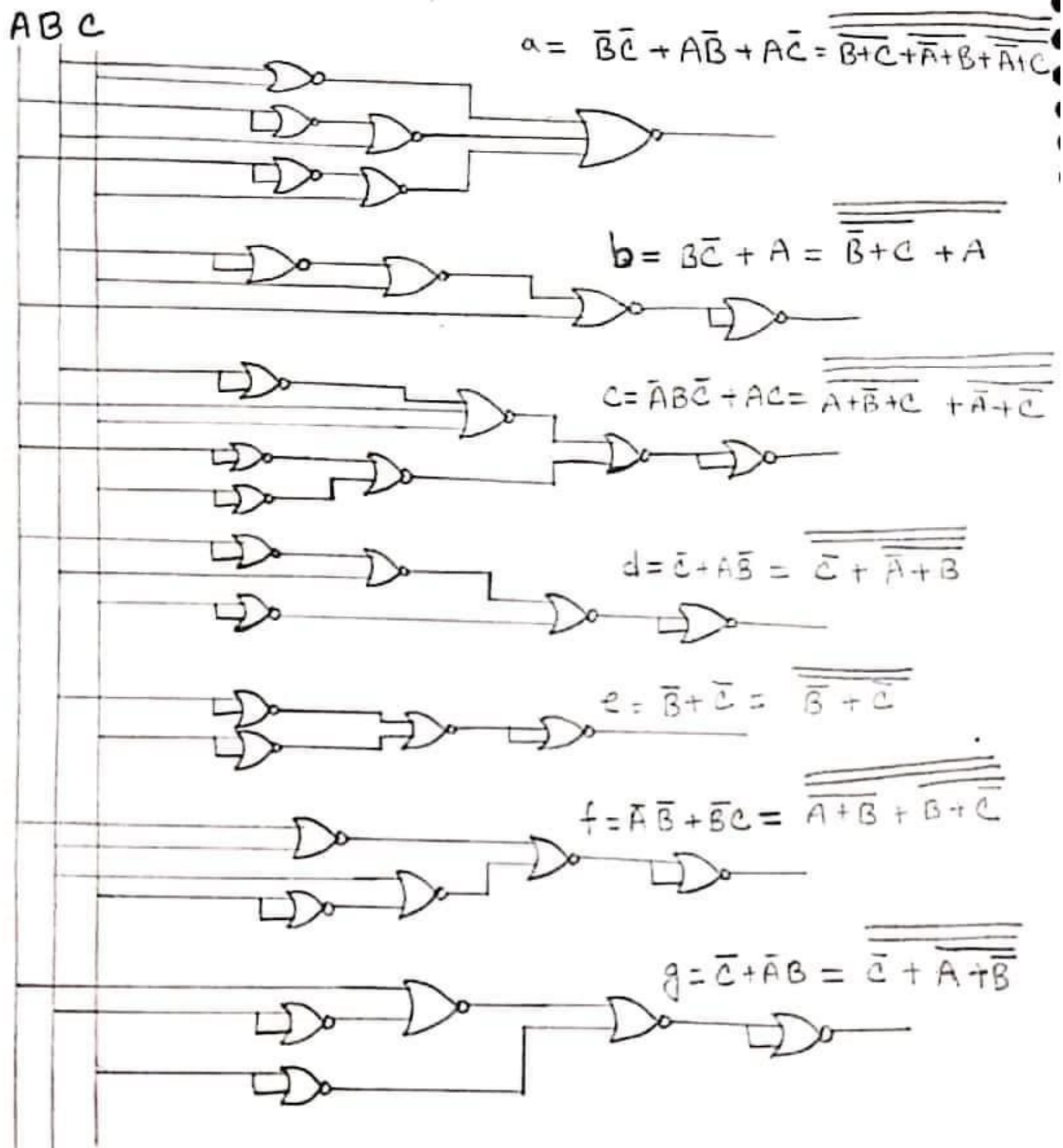


Figure : The seven segment decoder circuit for
EID-2021