



Project Report
CSE 231

Digital Logic Design
Section 11
Workstation-08

Using combinational circuit print: **SASJ-G08** in 7 segment display

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North South University
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Index	A	B	C	a	b	c	d	e	f	g	
0	0	0	0	1	0	1	1	0	1	1	S
1	0	0	1	1	1	1	0	1	1	1	A
2	0	1	0	1	0	1	1	0	1	1	S
3	0	1	1	0	1	1	1	1	0	0	J
4	1	0	0	0	0	0	0	0	0	1	-
5	1	0	1	1	0	1	1	1	1	0	G
6	1	1	0	1	1	1	1	1	1	0	0
7	1	1	1	1	1	1	1	1	1	1	8

Generalized Functions:

$$a = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + \bar{A}BC + A\bar{B}\bar{C} + A\bar{B}C \\ = \Sigma(0, 1, 2, 5, 6, 7)$$

$$b = \bar{A}\bar{B}C + \bar{A}BC + A\bar{B}\bar{C} + A\bar{B}C = \Sigma(1, 3, 6, 7)$$

$$c = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + \bar{A}BC + A\bar{B}\bar{C} + A\bar{B}C + \\ ABC = \Sigma(0, 1, 2, 3, 5, 6, 7)$$

$$d = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + \bar{A}BC + A\bar{B}\bar{C} + A\bar{B}C \\ = \Sigma(0, 2, 3, 5, 6, 7)$$

$$e = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + A\bar{B}\bar{C} + A\bar{B}C + ABC \\ = \Sigma(1, 3, 5, 6, 7)$$

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

$$\Sigma(0,1,2,5,6,7)$$

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

$$= \Sigma(0,1,2,4,7)$$

K-map for $a = f$

	$\bar{B}\bar{C}$	$\bar{B}C$	$B\bar{C}$	BC
A'	1	1	0	1
A	0	1	1	1

$$F = \bar{A}\bar{B} + \bar{B}C + AC + AB + B\bar{C}$$

K-map for b

	$\bar{B}\bar{C}$	$\bar{B}C$	$B\bar{C}$	BC
A'	0	1	1	0
A	0	0	1	1

$$F = A\bar{C} + AB$$

K-map for c

	$\bar{B}\bar{C}$	$\bar{B}C$	$B\bar{C}$	BC
A'	1	1	1	1
A	0	1	1	1

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

K-map for d

	$\bar{B}\bar{C}$	$\bar{B}C$	$B\bar{C}$	BC
A'	1	0	1	1
A	0	1	1	1

$$F = B + AC + A\bar{C}$$

K-map for e

	$B'C'$	$B'C$	BC	BC'
A'	0	1	1	0
A	0	1	1	1

$$F = C + AB$$

K-map for g

	$B'C'$	$B'C$	BC	BC'
A'	1	1	0	1
A	1	0	1	0

$$F = A'B + B'C' + A'C' + ABC$$

5. Simplification for sop

$$i) a = A'B + B'C + AC + AB + B'C'$$

$$ii) b = A'C + AB$$

$$iii) c = C + B + A'B + A'C'$$

$$iv) d = B + AC + A'C'$$

$$v) e = C + AB$$

$$vi) f = A'B + B'C + AC + AB + B'C'$$

$$vii) g = A'B + B'C' + A'C' + ABC$$

Generalized POS Function :

$$a = AB'C' + A'BC = (A+B+C)(A+B'+C) = \pi(3,4)$$

$$b = A'B'C' + A'BC' + AB'C' + ABC' = (A+B+C)(A+B'+C)(A'+B+C)(A'+B+C') = \pi(0,2,4,6)$$

$$c = AB'C' = A+B+C = \pi(4)$$

$$d = A'BC + AB'C' = (A+B+C')(A'+B+C) = \pi(1,4)$$

$$e = A'B'C' + A'BC' + AB'C' = (A+B+C)(A+B'+C)(A'+B+C) = \pi(0,2,4)$$

$$f = AB'C' + A'BC = (A+B+C)(A+B'+C') = \pi(3,4)$$

$$g = A'BC + AB'C + ABC' = (A+B'+C')(A'+B+C')(A'+B'+C) = \pi(3,5,6)$$

k-map for $a=f$

	B'C'	B'C	BC	BC'
A'	1	1	0	1
A	0	1	1	1

$$F = (A+B+C')(A'+B+C)$$

k-map for b

	B'C'	B'C	BC	BC'
A'	0	1	1	0
A	0	0	1	1

$$F = (A+C)(B+C)(A'+B)$$

K-map for c

	$B'C$	$B'C$	BC	BC'
A'	1 0	1 1	1 3	1 2
A	0 4	1 5	1 7	1 6

$$F = A' + B + C$$

K-map for d

	$B'C$	$B'C$	BC	BC'
A'	1 0	0 1	1 3	1 2
A	0 4	1 5	1 7	1 6

$$F = (A + B + C)(A' + B + C)$$

K-map for e

	$B'C$	$B'C$	BC	BC'
A'	0 0	1 1	1 3	0 2
A	0 4	1 5	1 7	1 6

$$F = (A + C)(B + C)$$

K-map for g

	$B'C$	$B'C$	BC	BC'
A'	1 0	1 1	0 3	1 2
A	1 4	0 5	1 7	0 6

$$F = (A + B' + C')(A' + B + C)(A' + B' + C)$$

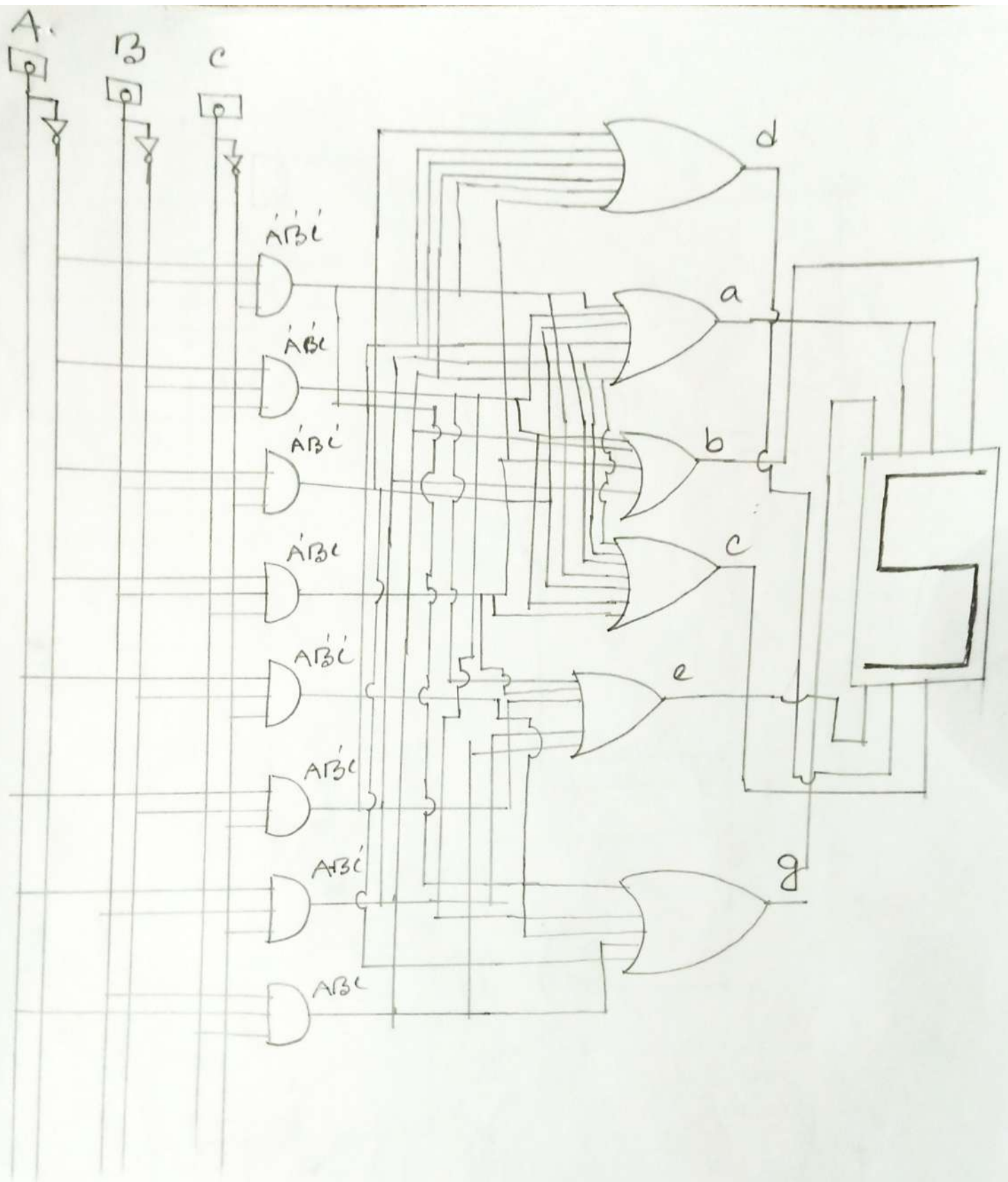


Fig: Generalized SOP Circuit Diagram Using Basic gates.

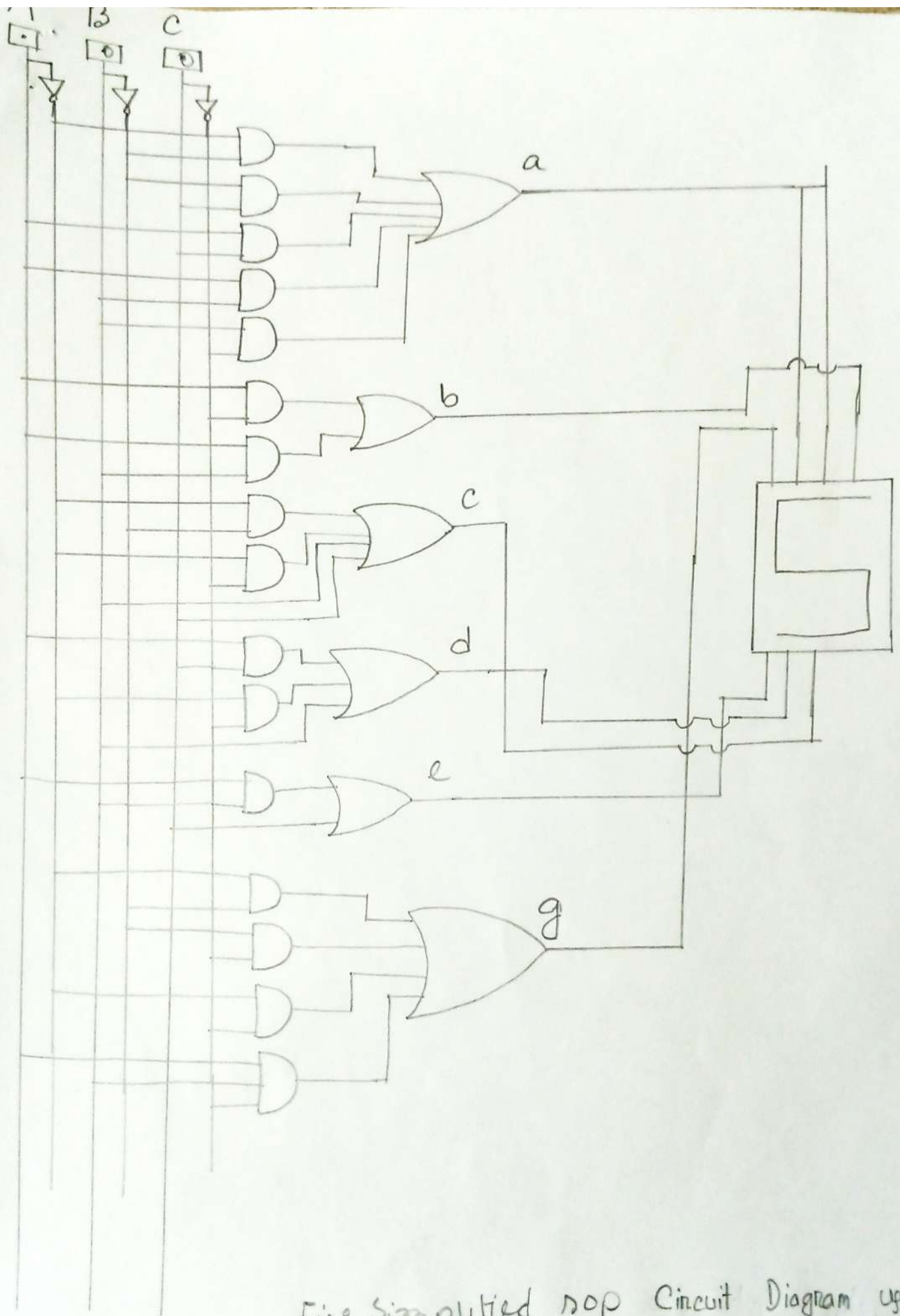


Fig: Simplified nop Circuit Diagram using basic gates.

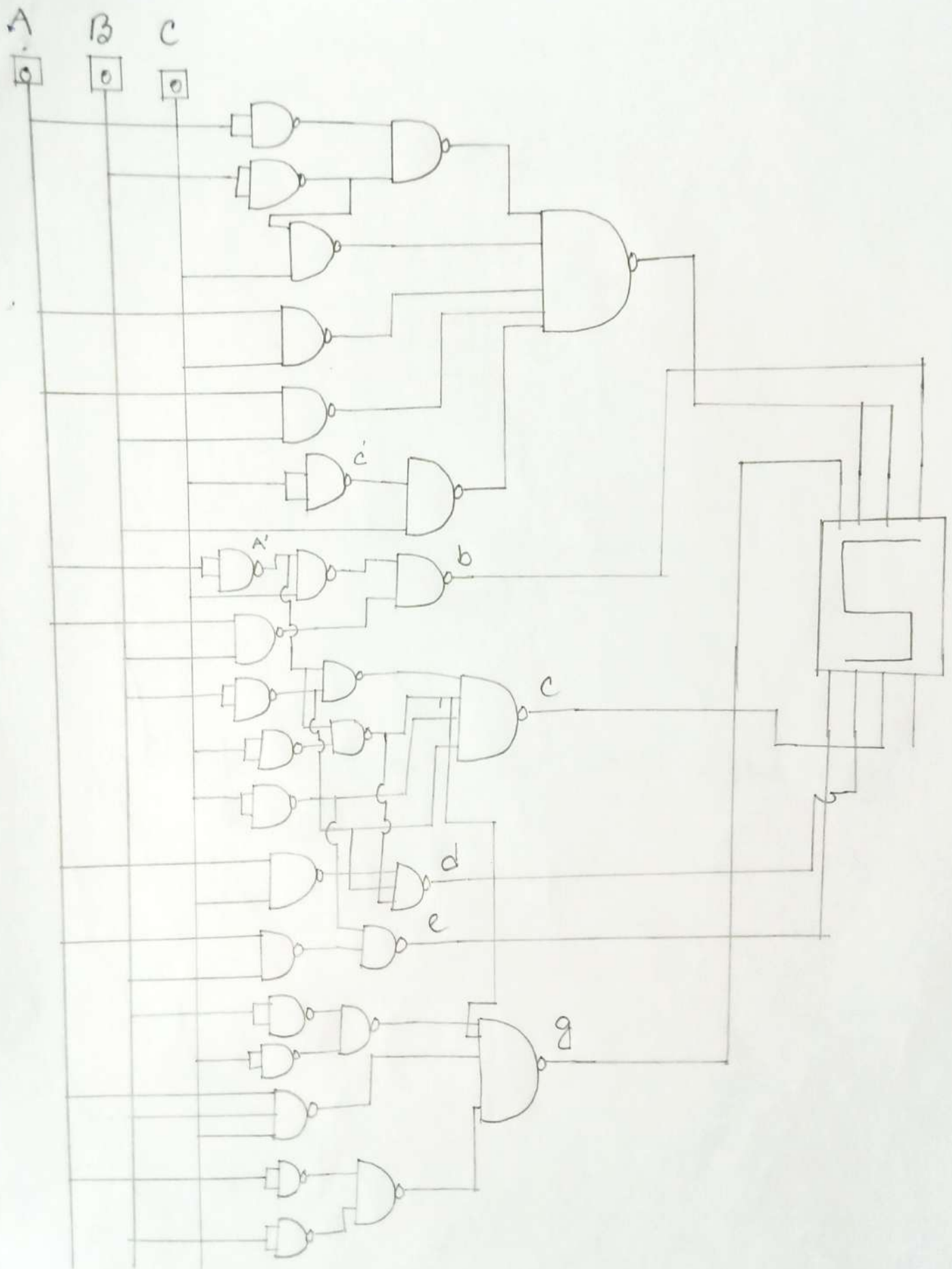


Fig: Simplified SOP Circuit Diagram using NAND gates.

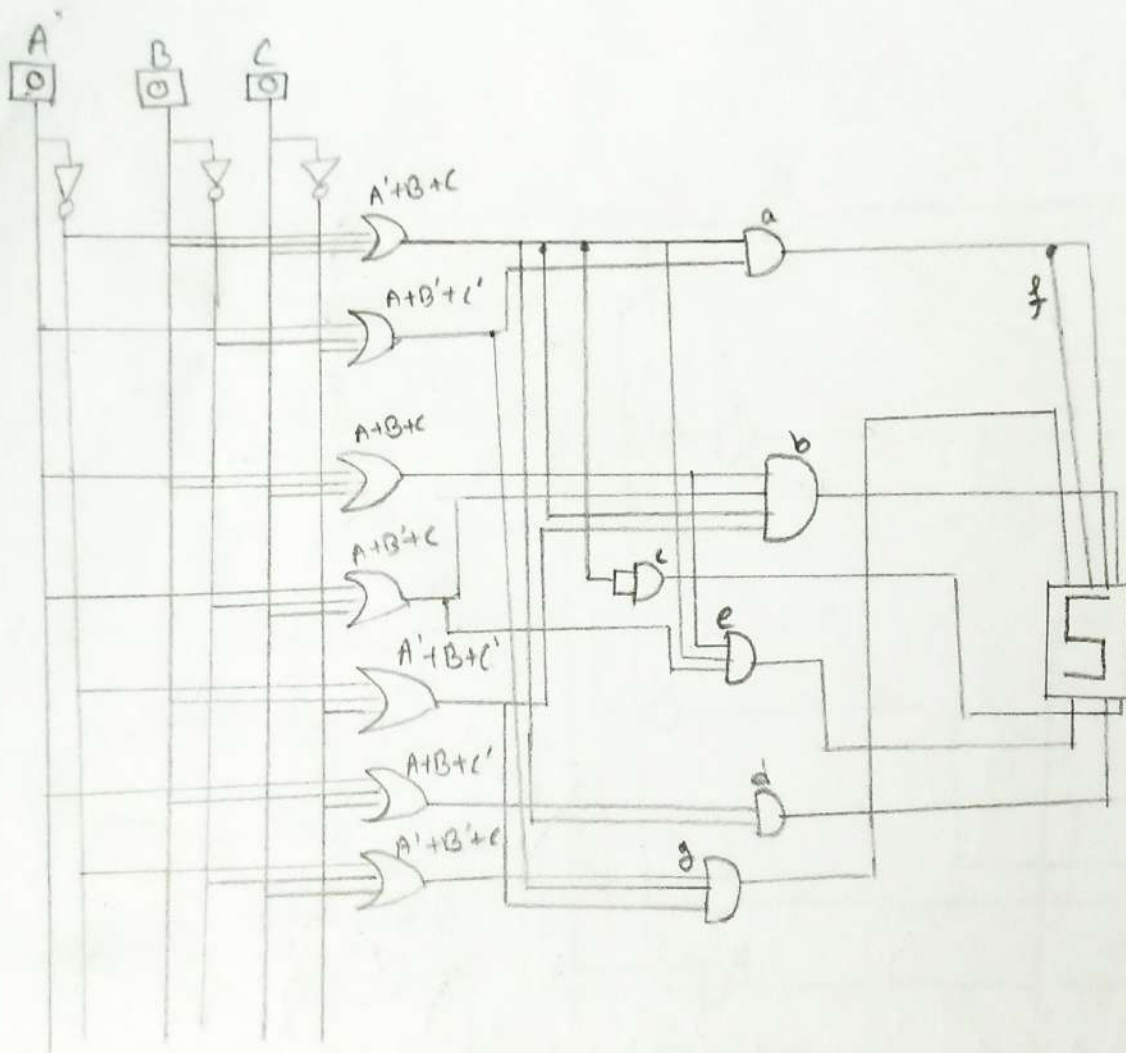


Fig: Generalized POS circuit diagram using basic gates.

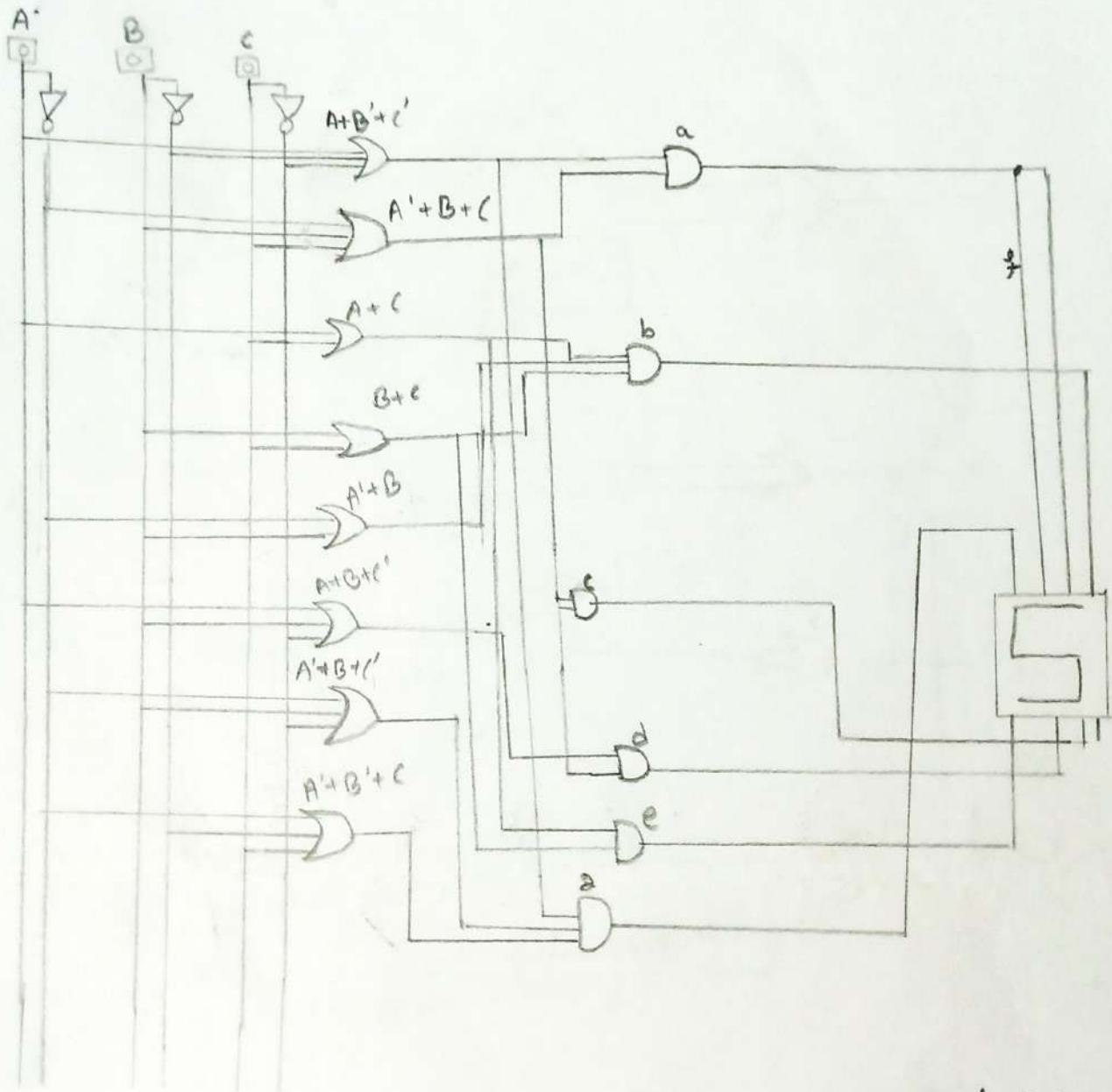
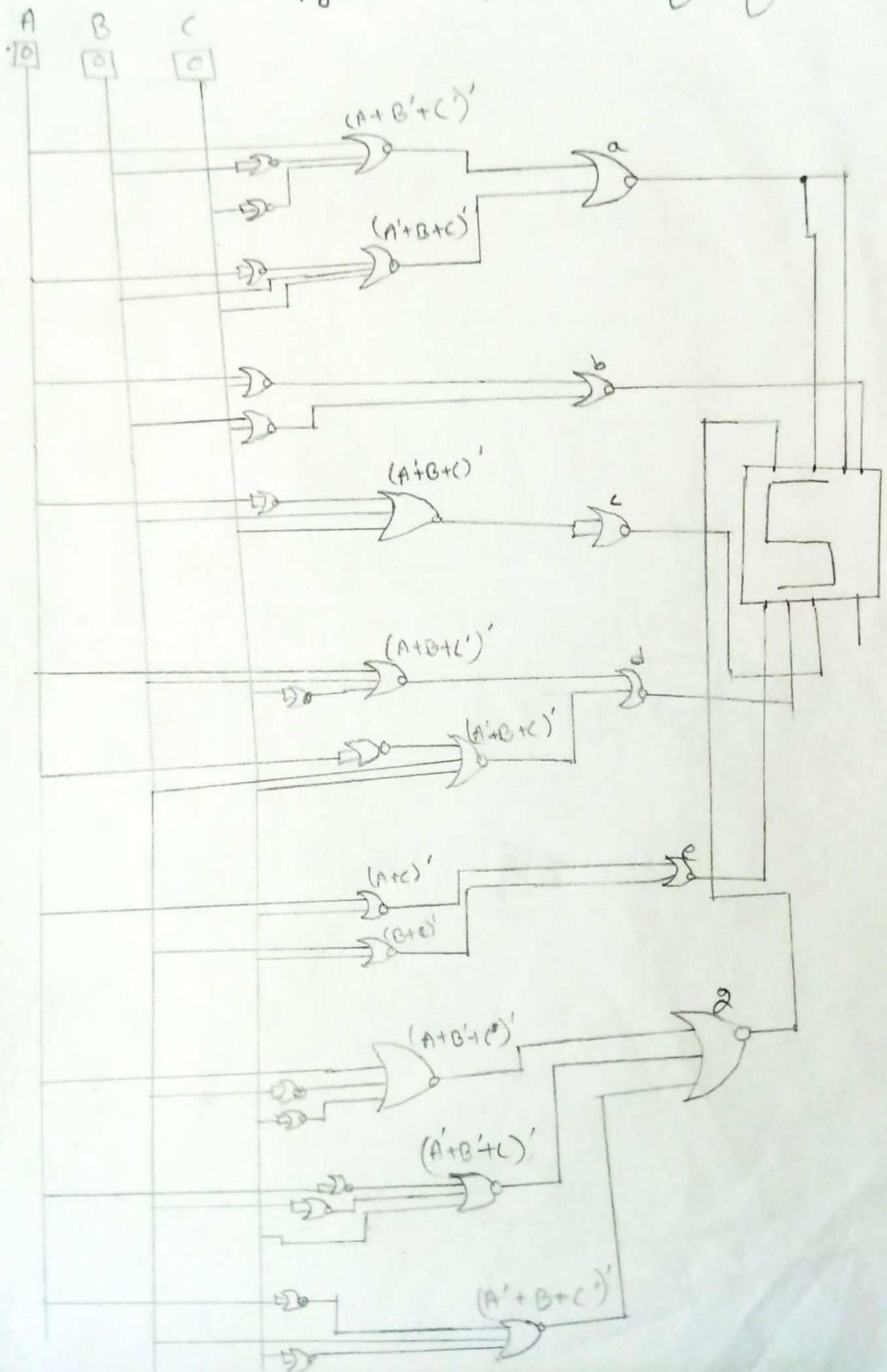


Fig. Simplified pos circuit Diagram
using basic gates

Fig: Simplified POS using only NOR gates



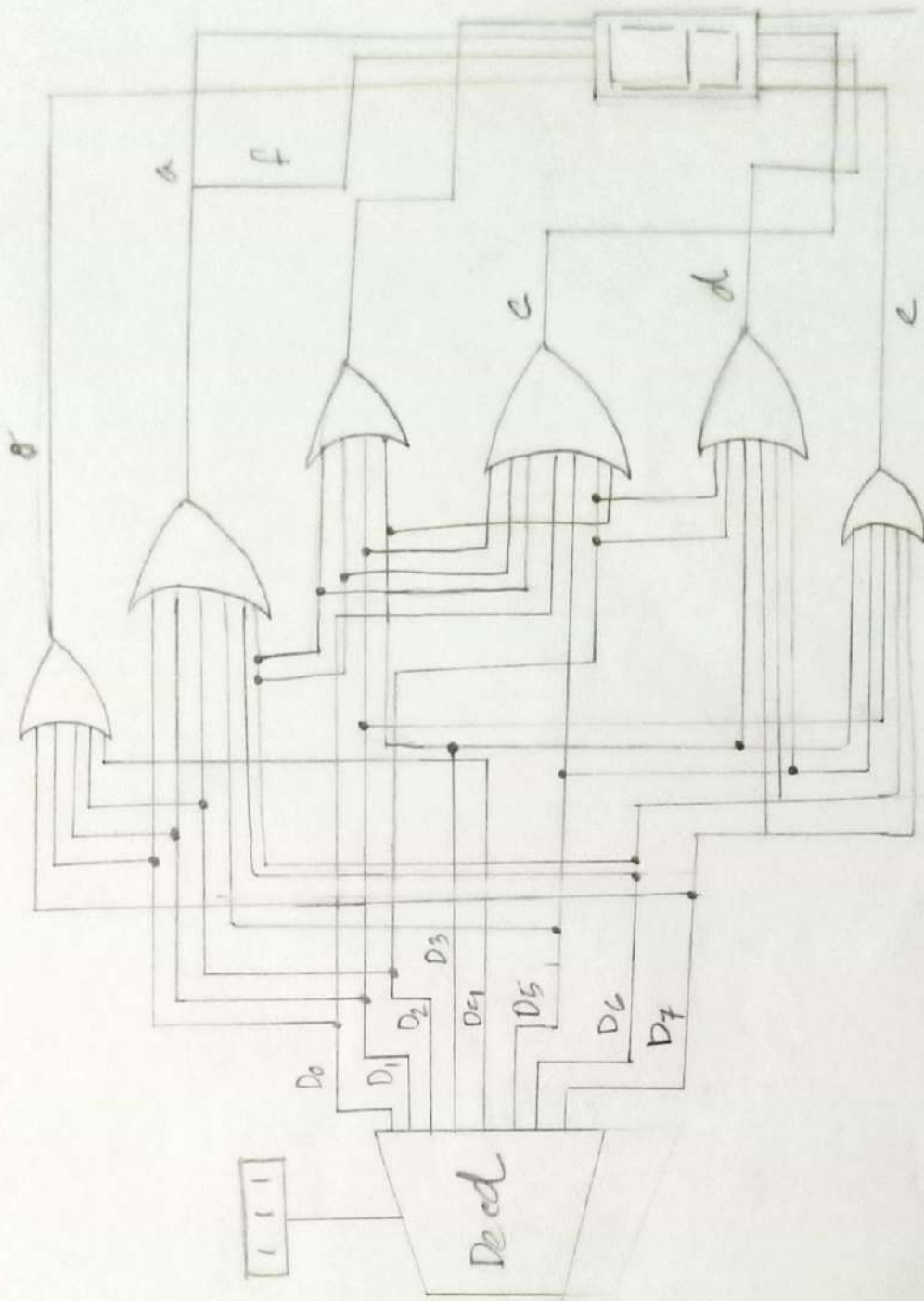
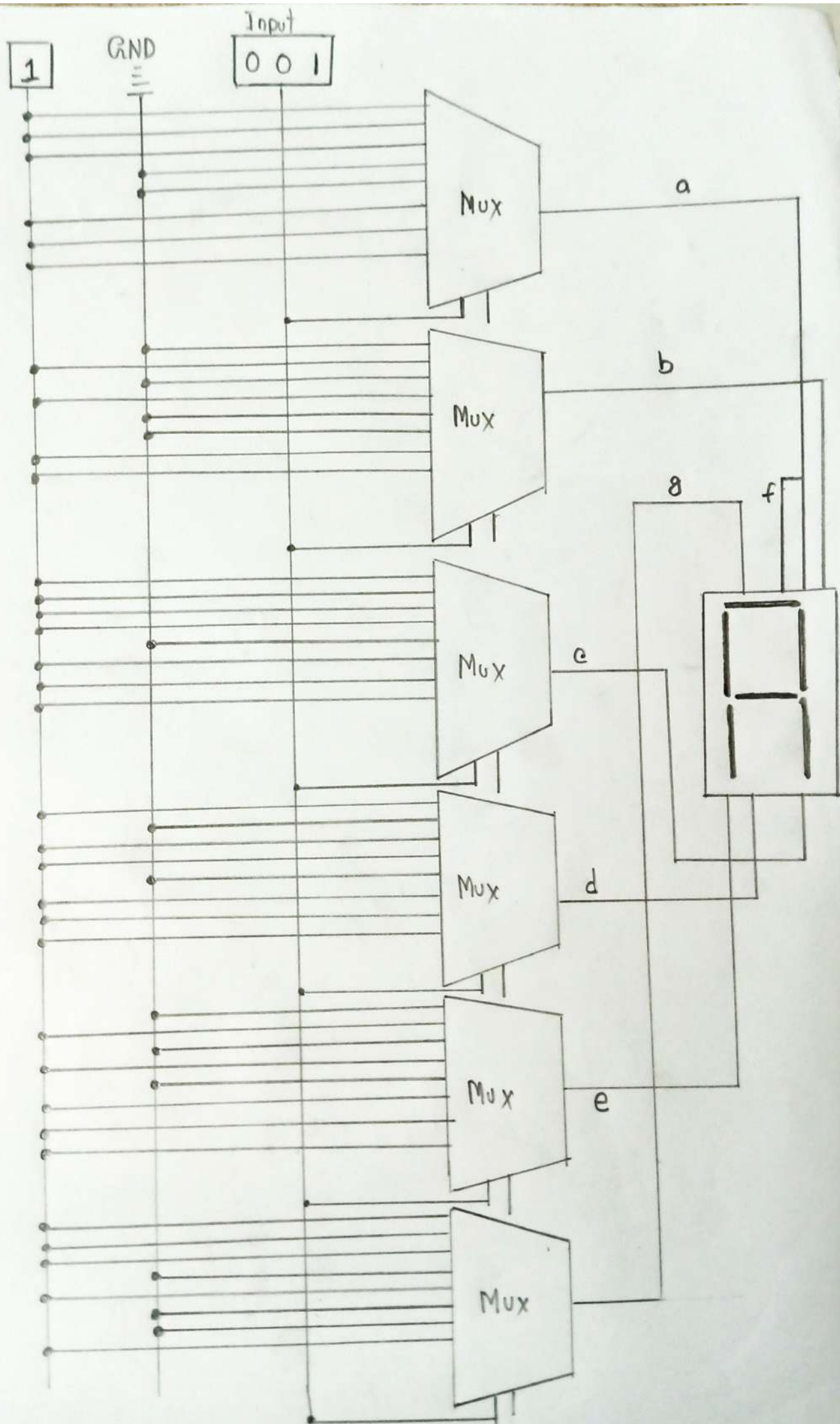


Fig: Generalized SOP Circuit Diagram using Decoder and

OR gate.

Fig: Generalized SOP Multiplexer



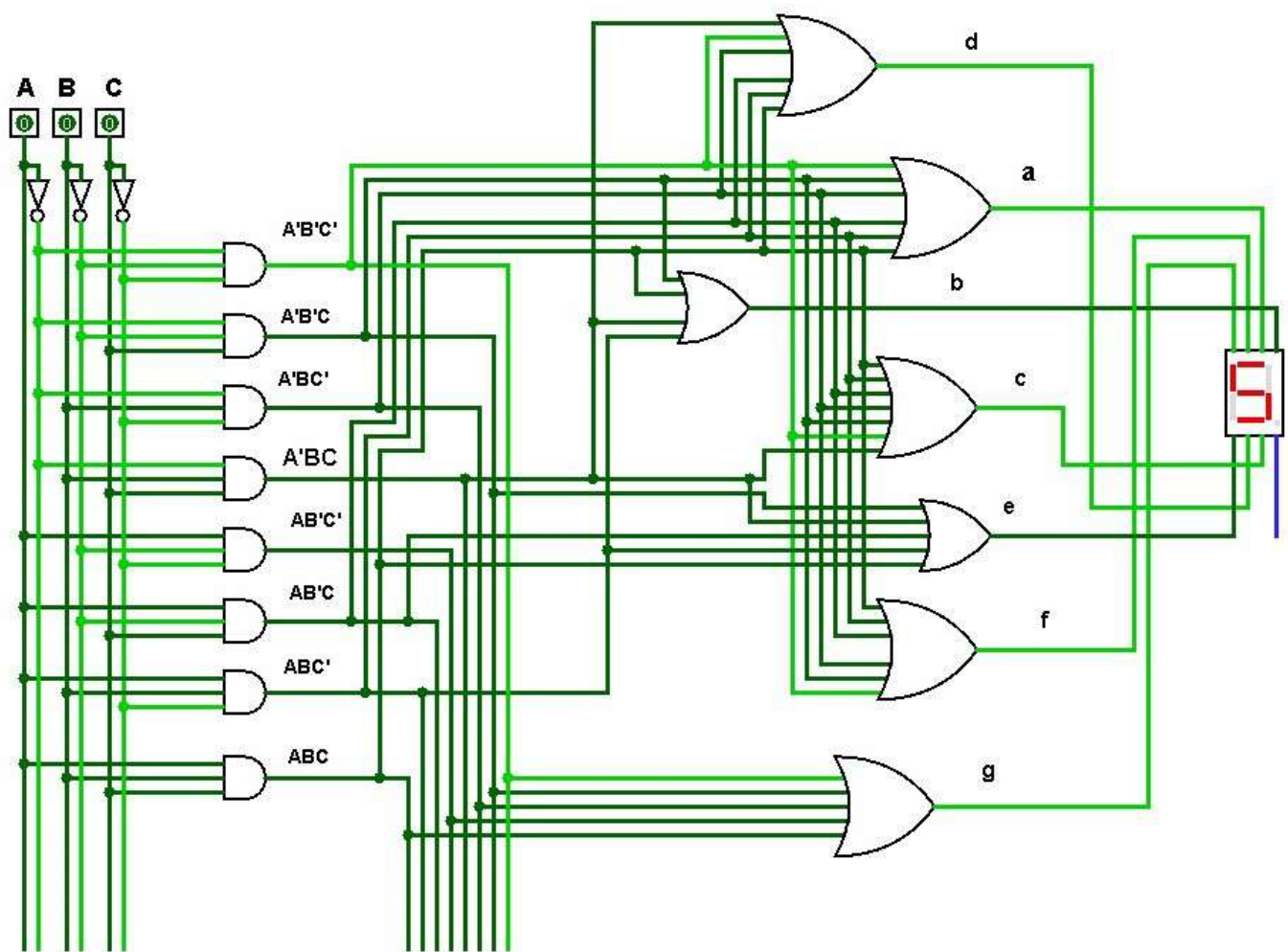


Fig. Circuit Diagram For Generalized SOP Equation

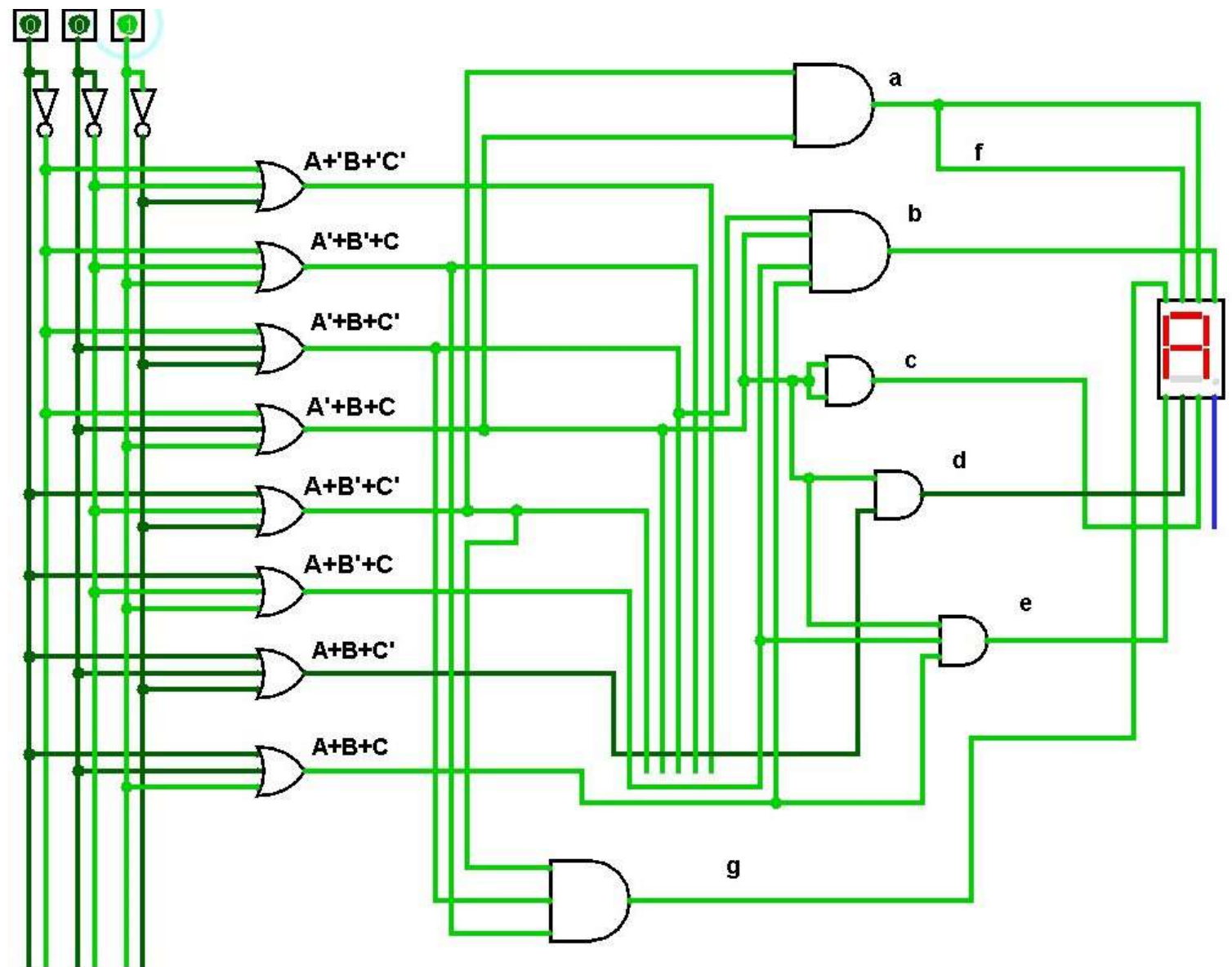


Fig. Circuit Diagram for Simplified SOP Using Basic Gates

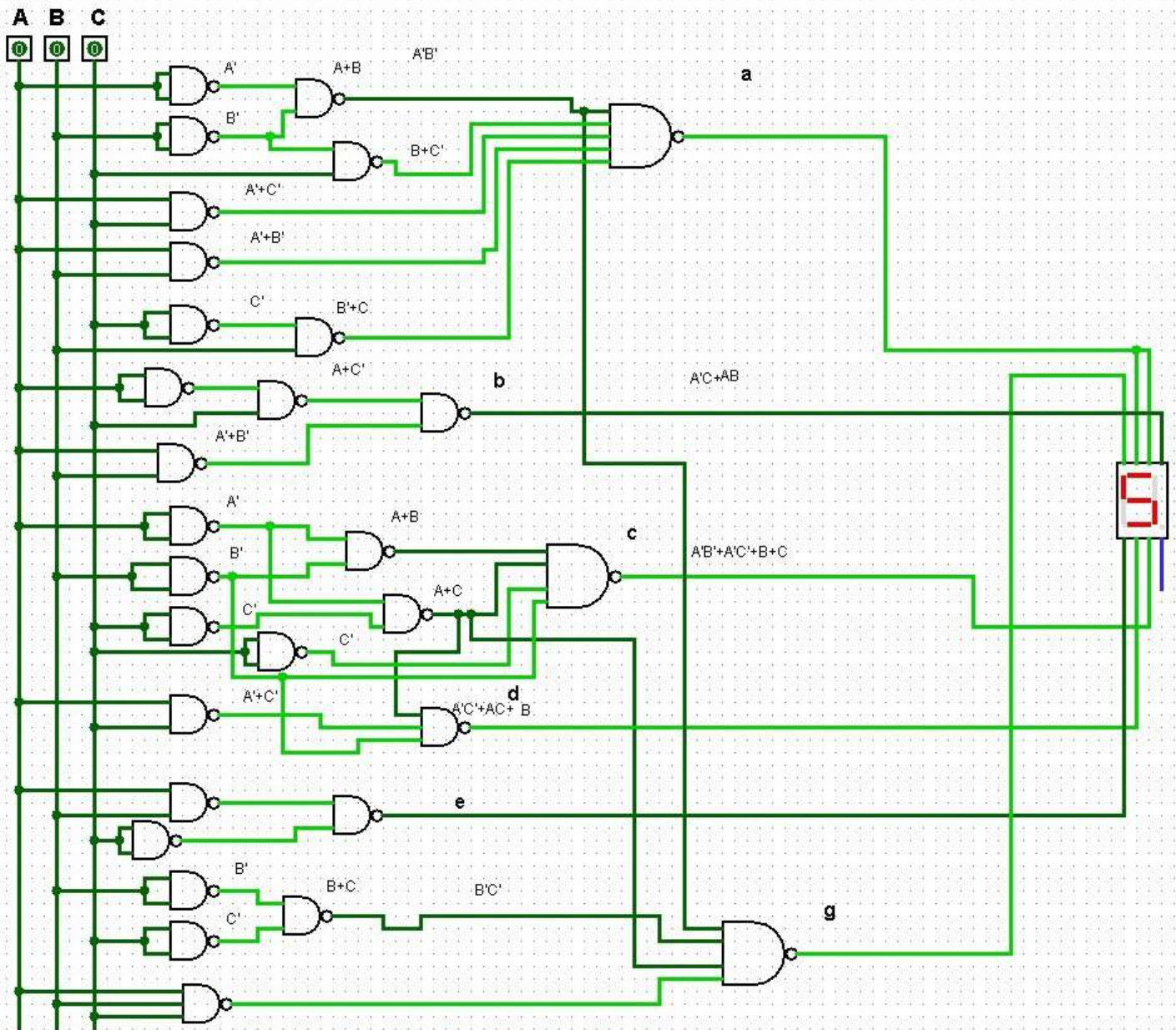


Fig. Circuit Diagram of SOP using only NAND Gates

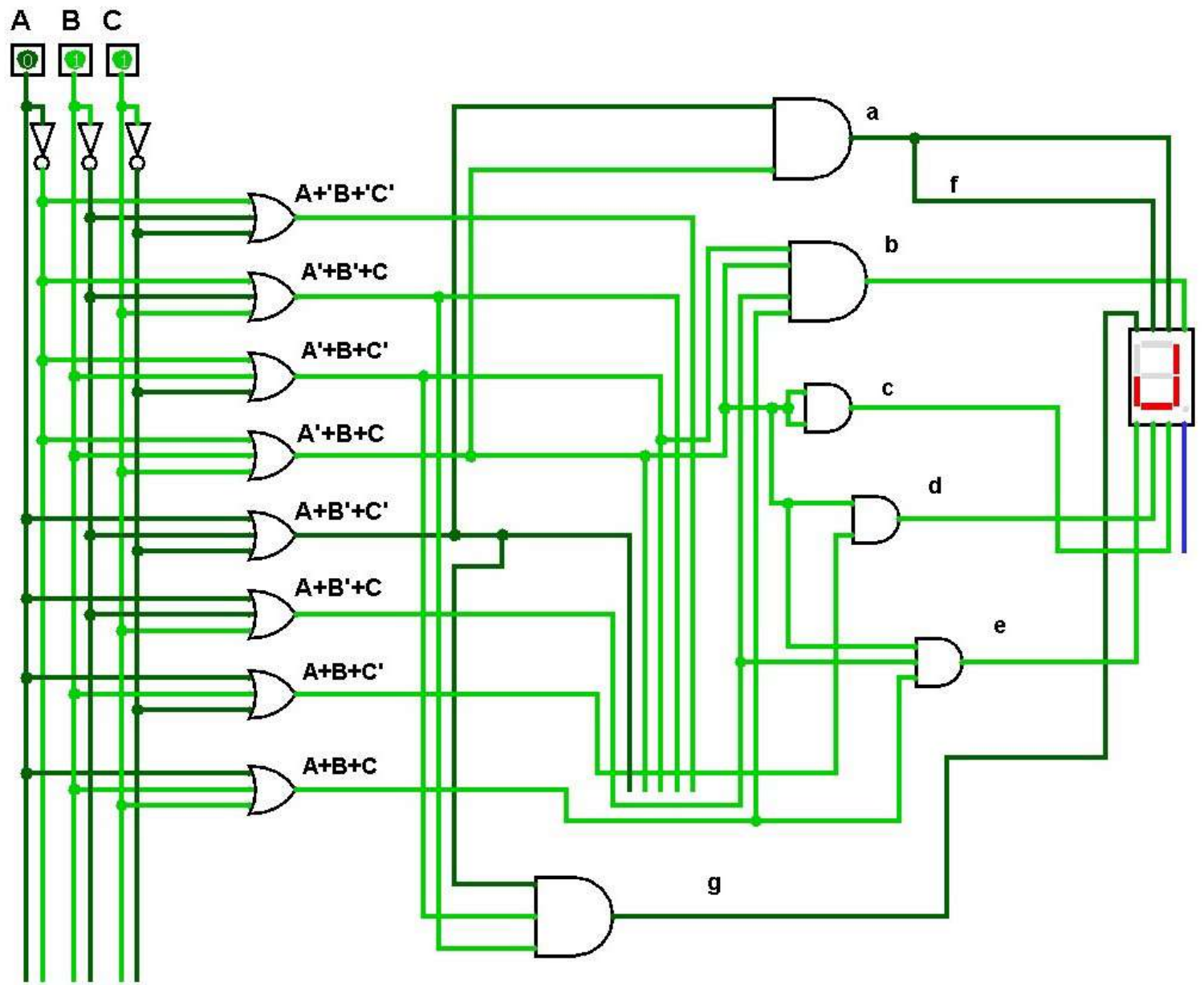


Fig. Circuit Diagram of Generalized POS

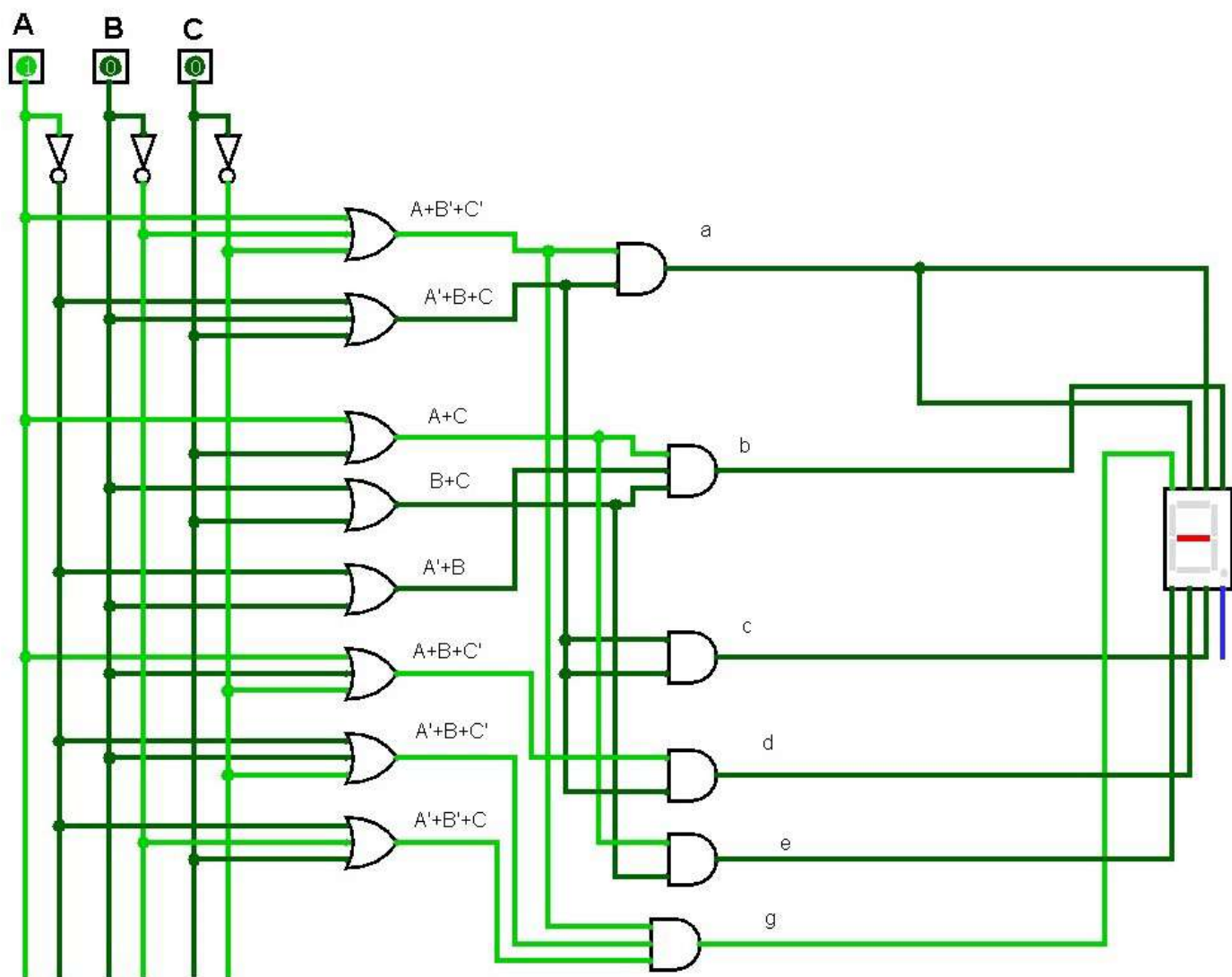


Fig.Circuit Diagram for Simplified POS Using Basic Gates

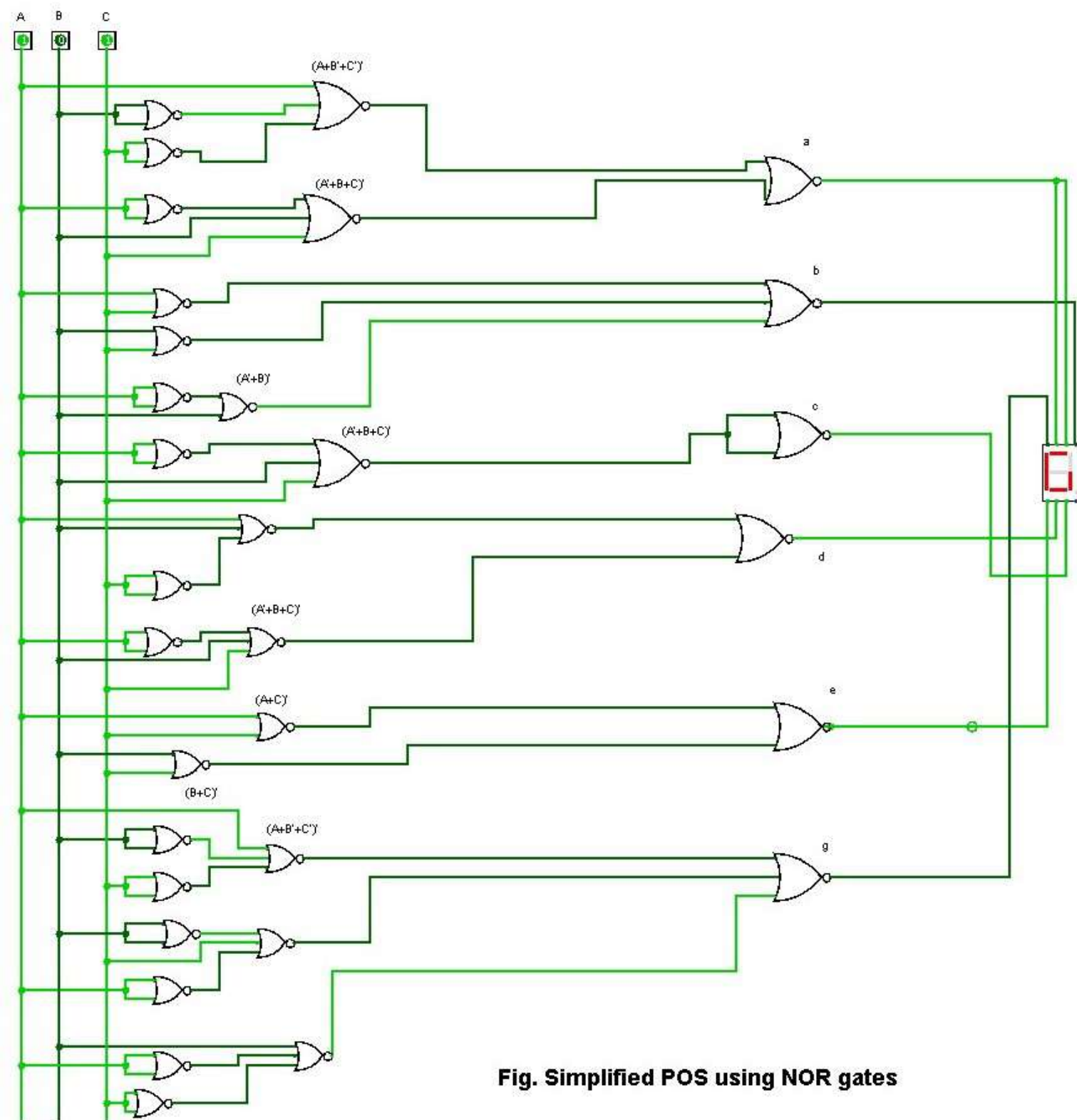


Fig. Simplified POS using NOR gates

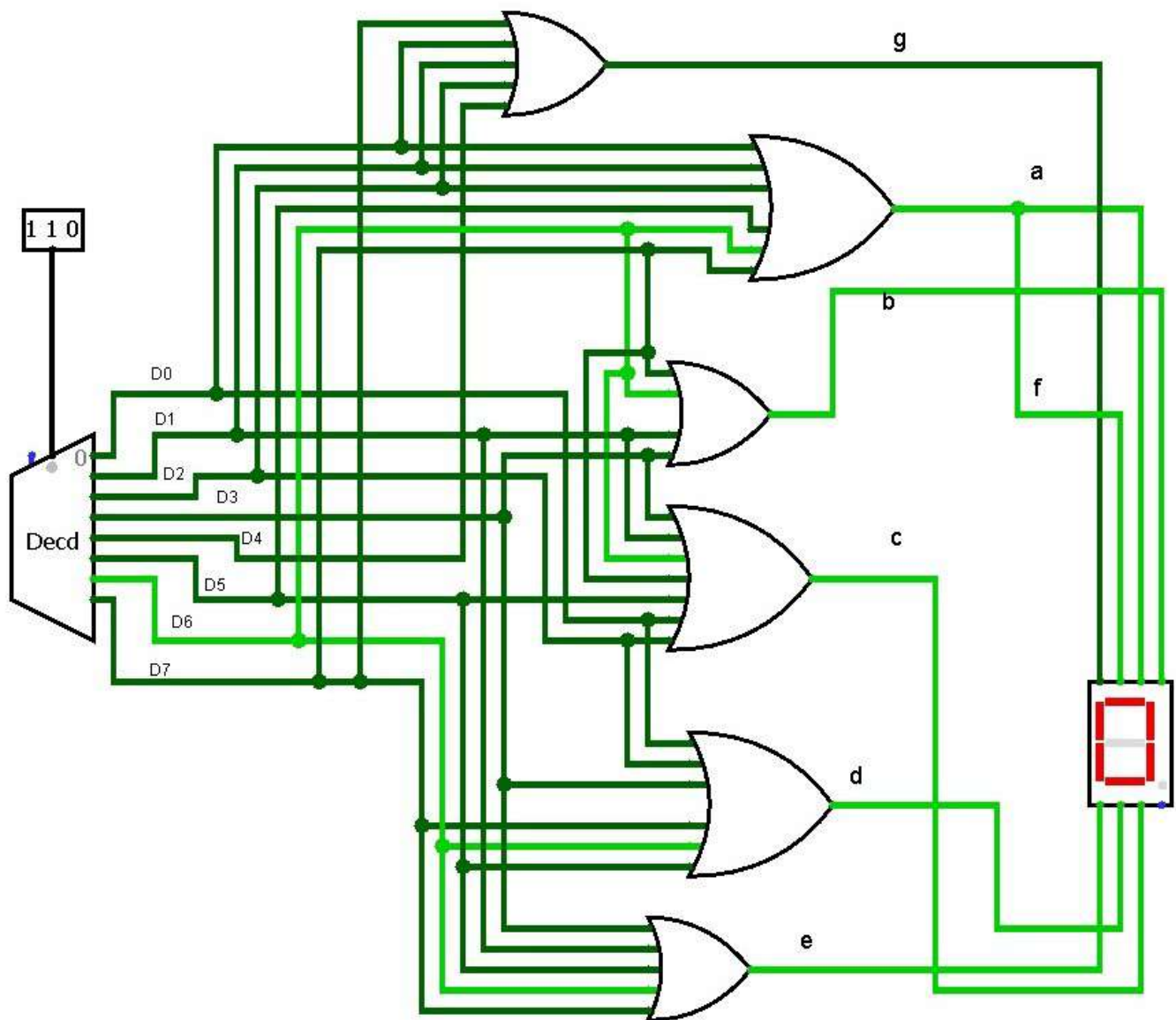
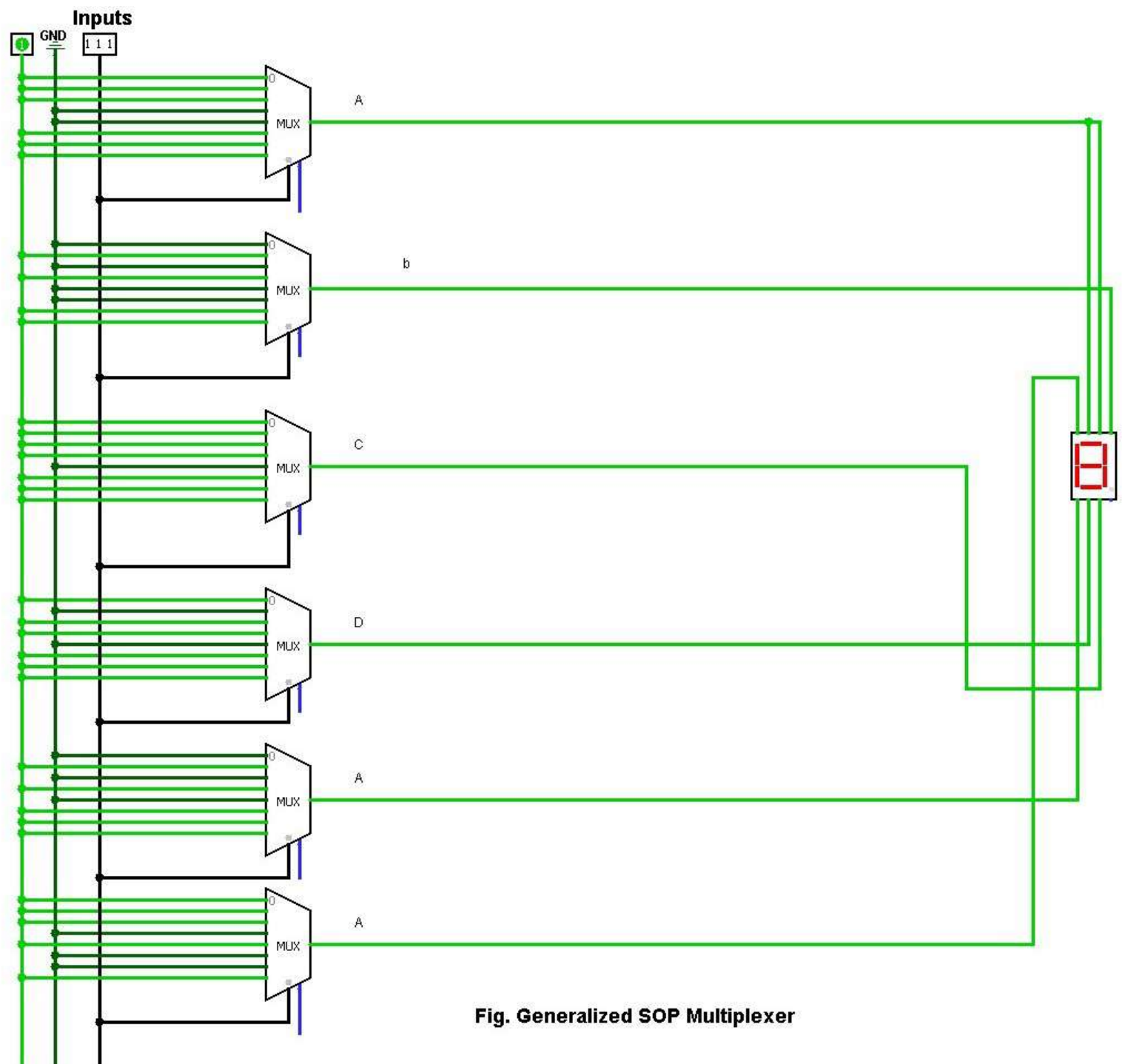
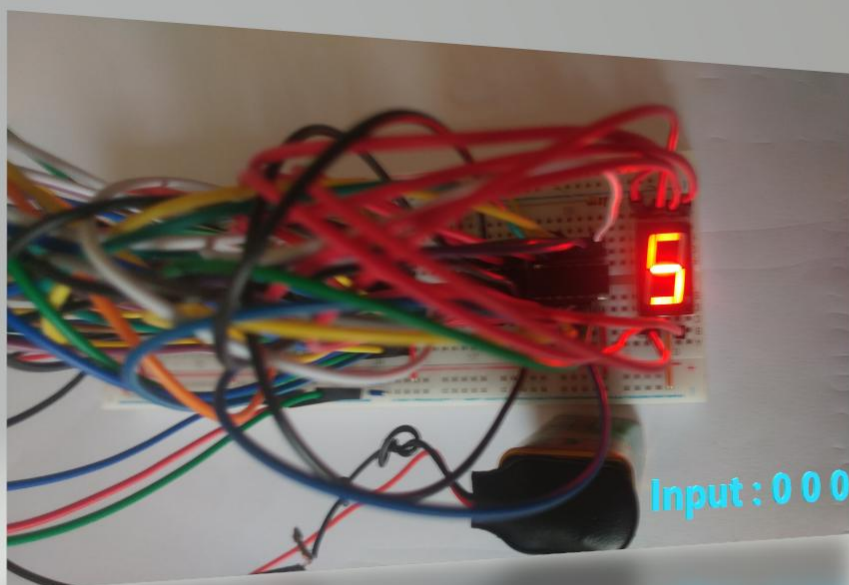
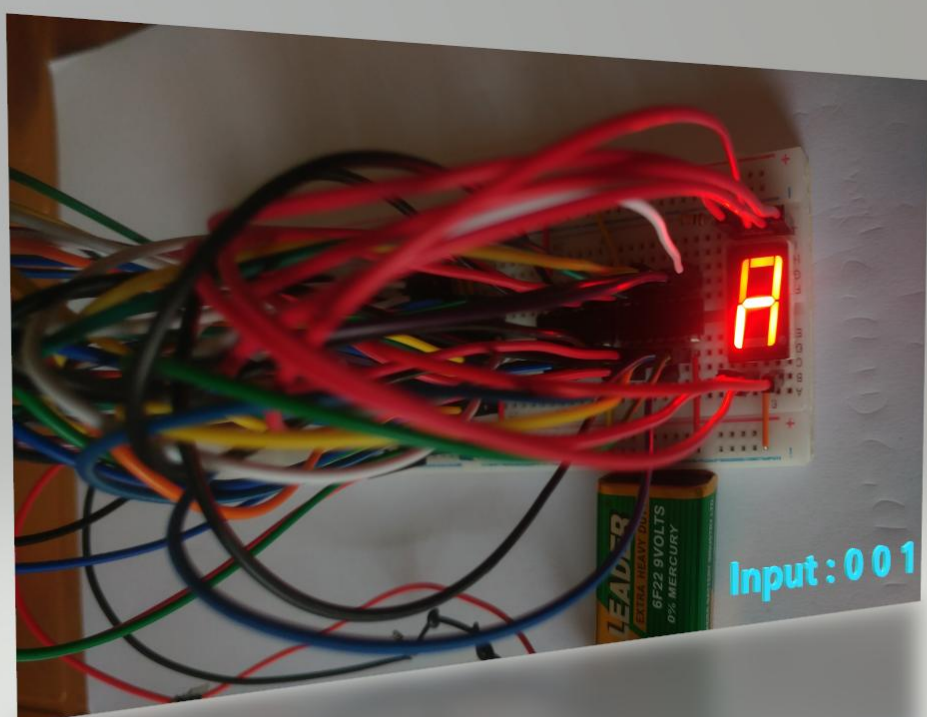
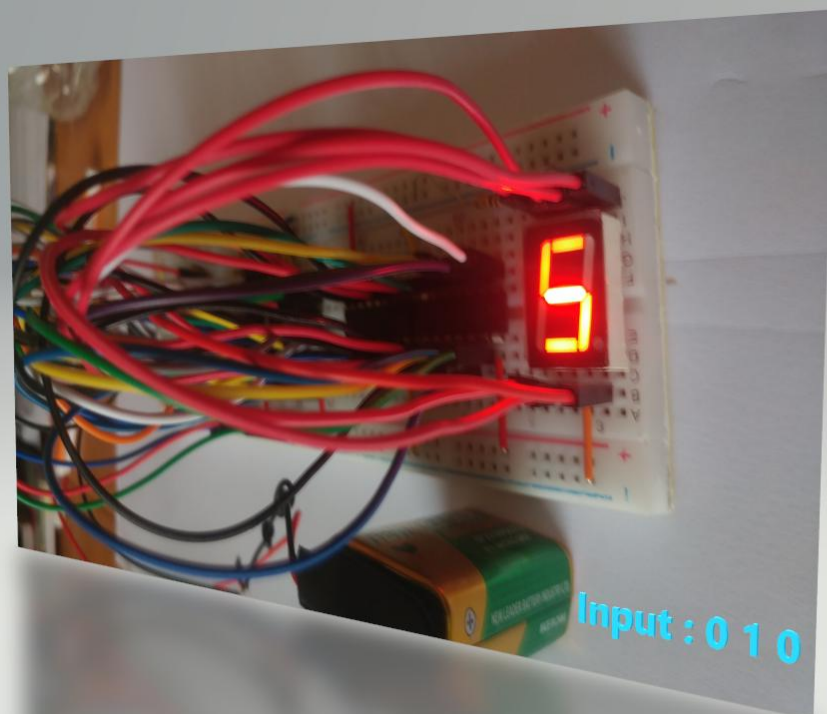


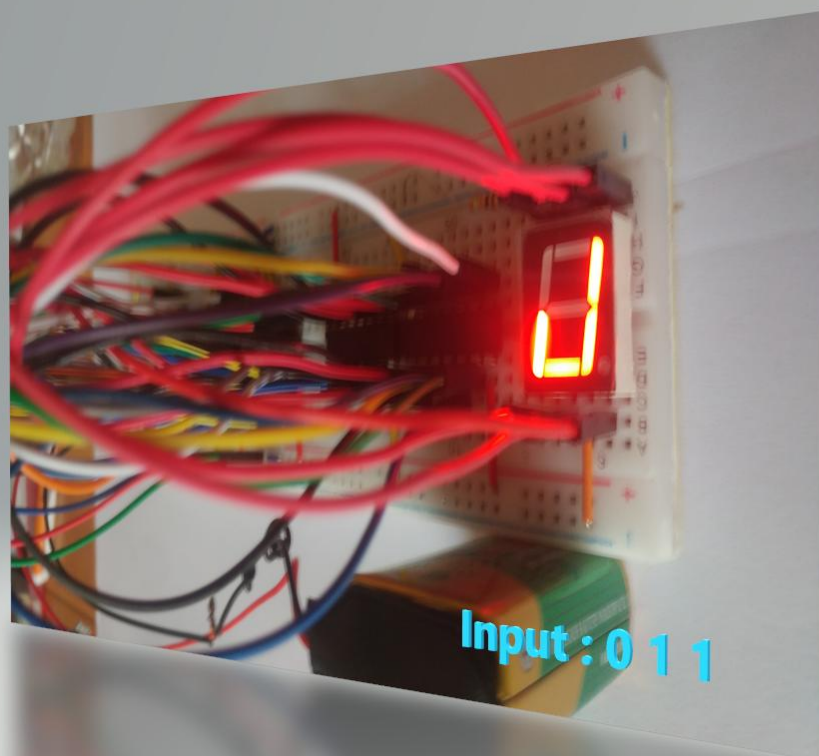
Fig. Generalized SOP Using Decoder and OR Gates

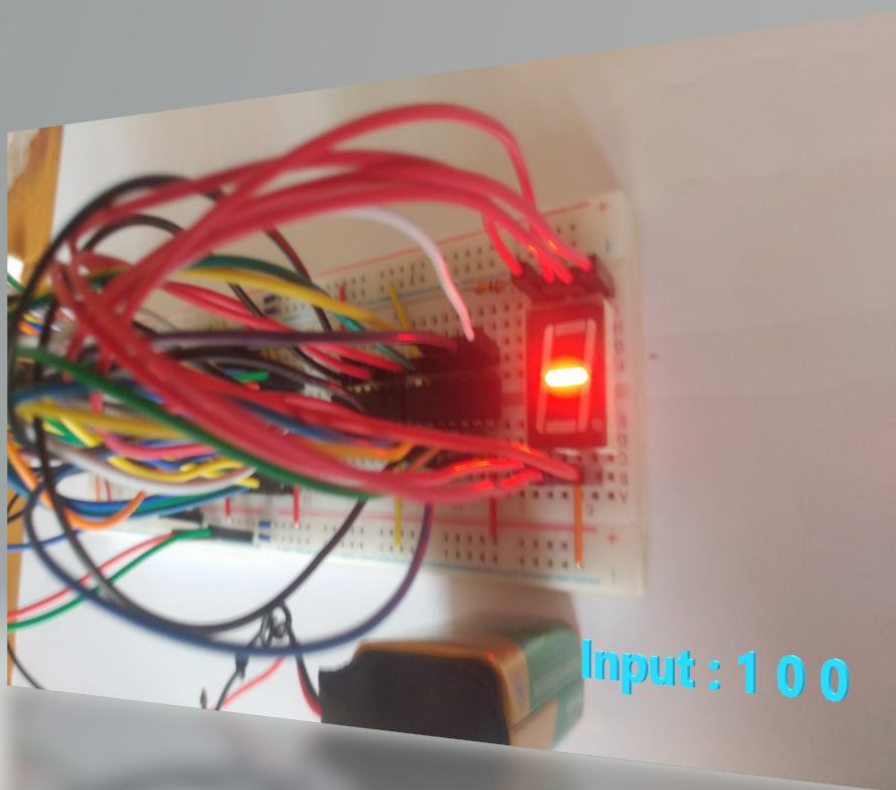


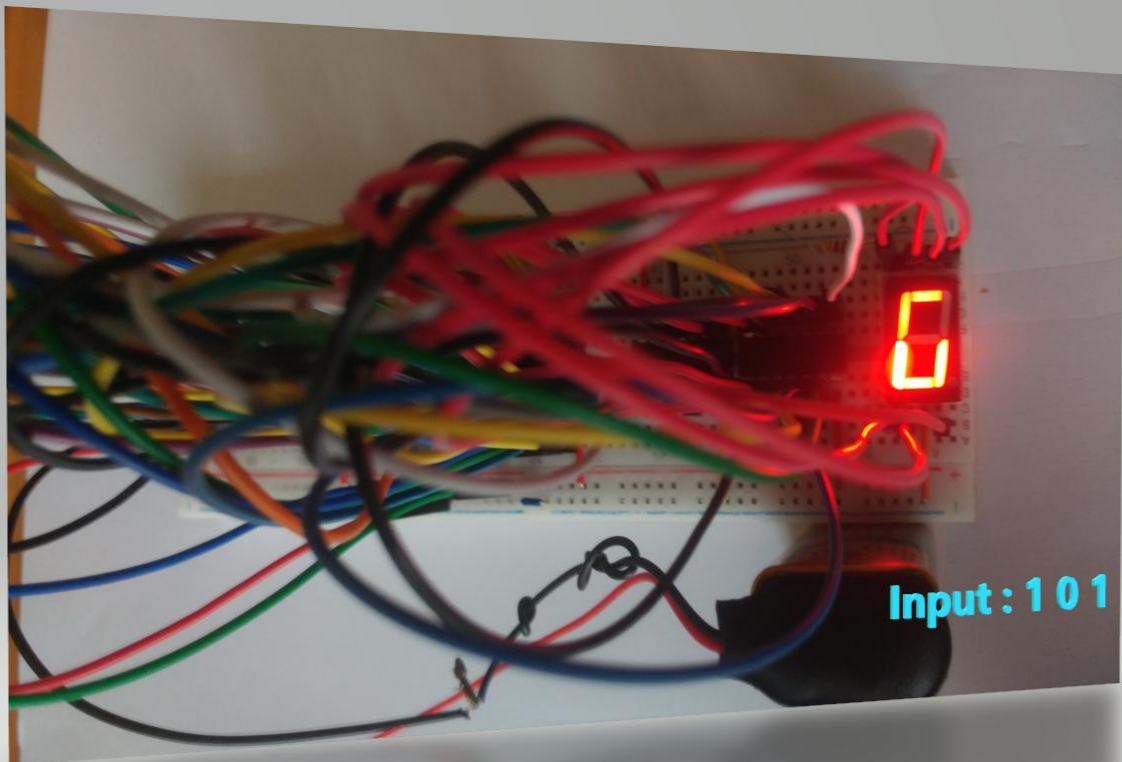












Input : 1 0 1

