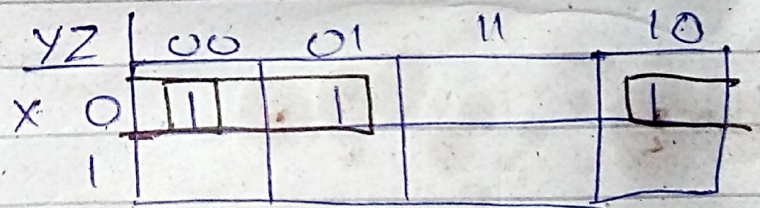
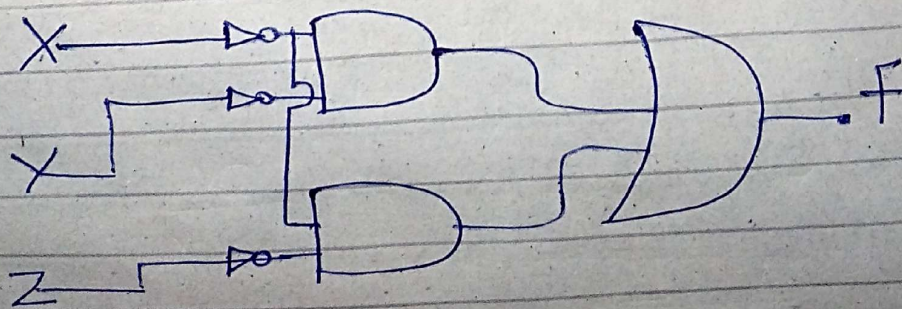


4-1 Design a combinational circuit with three input and one output. The output is equal to logic 1 when binary values of input is less than 3 otherwise 0.

input			output
X	Y	Z	F
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0



$$\bar{X}\bar{Y} + \bar{X}\bar{Z}$$



4.2 Design a combinational circuit with three input  $x, y$  &  $z$

X	Y	Z	A	B	C
0	0	0	0	0	1
0	0	1	0	1	0
0	1	0	0	1	1
0	1	1	1	0	0
1	0	0	0	1	1
1	0	1	1	0	0
1	1	0	1	0	1
1	1	1	1	1	0

For A =

YZ	00	01	11	10
X=0			1	
X=1		1	1	1

$$A = XZ + YZ + XY$$

For B =

YZ	00	01	11	10
X		1		1
	1		1	

$$B = X \oplus Y \oplus Z$$

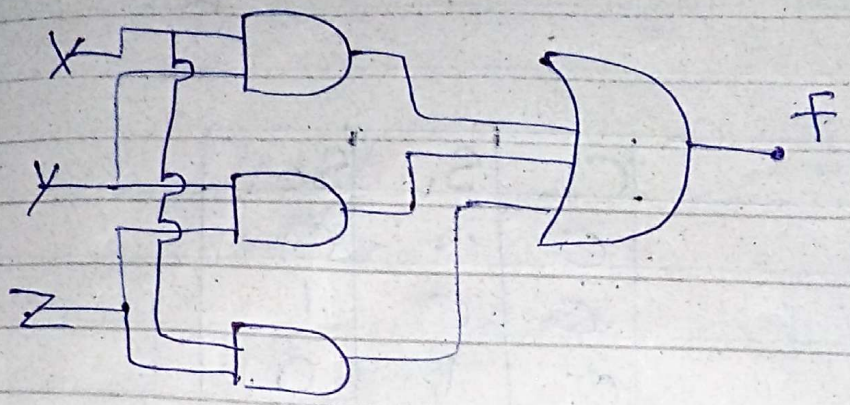
For C =

YZ	00	01	11	10
X=0	1			1
X=1	1			1

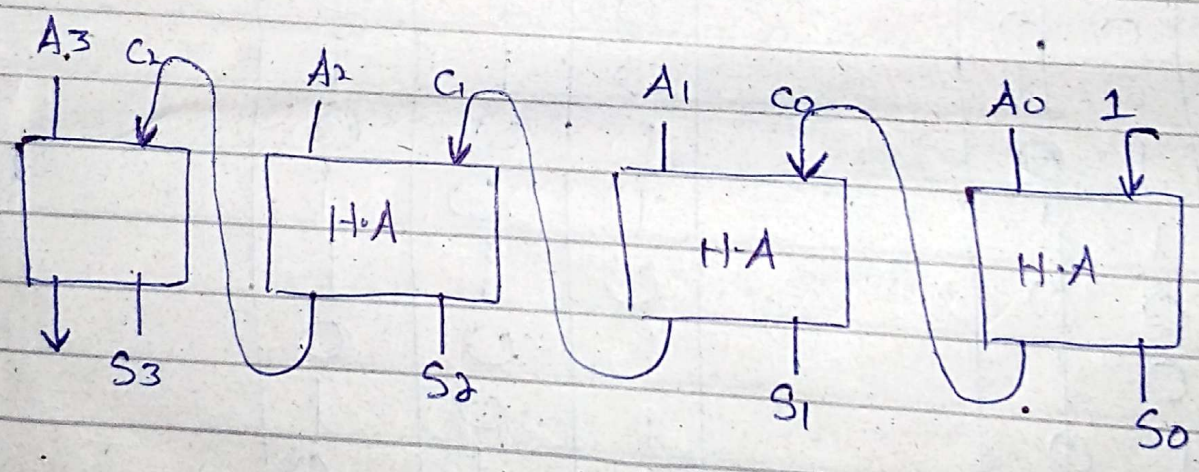
$$C = Z'$$

(4)

Circuit



4.4



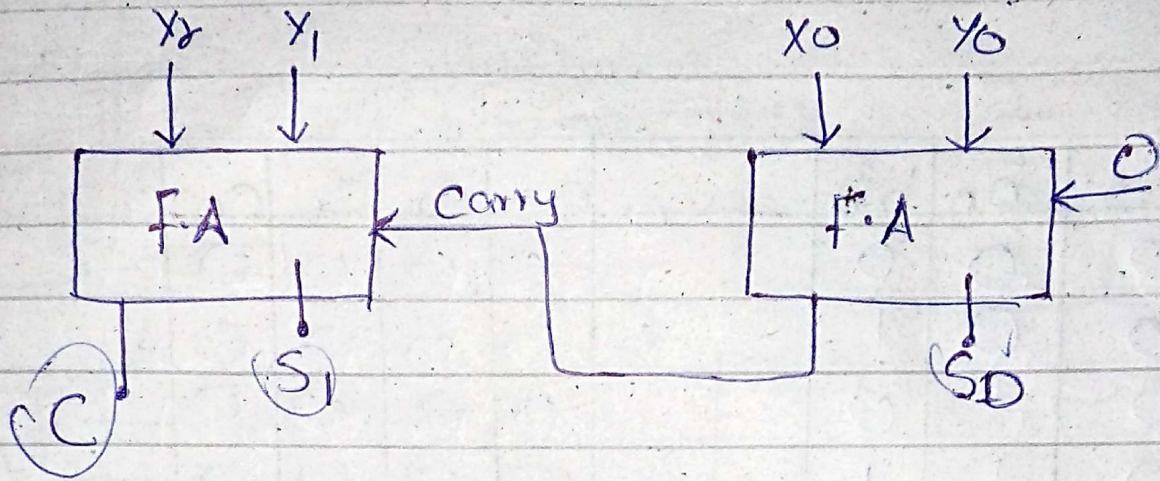
4.5

$\frac{x}{s}$

$\frac{00}{01}$

$X_1$	$X_0$	$Y_1$	$Y_0$		$C$	$S_1$	$S_0$
0	0	0	0		0	0	0
0	0	0	1		0	0	1
0	0	1	0		0	1	0
0	0	1	1		0	1	1
0	1	0	0		0	0	0
0	1	0	1		0	0	1
0	1	1	0		0	1	0
0	1	1	1		0	1	1
1	0	0	0		1	0	0
1	0	0	1		1	0	1
1	0	1	0		1	1	0
1	0	1	1		1	1	1
1	1	0	0		1	0	0
1	1	0	1		1	0	1
1	1	1	0		1	1	0
1	1	1	1		1	1	1

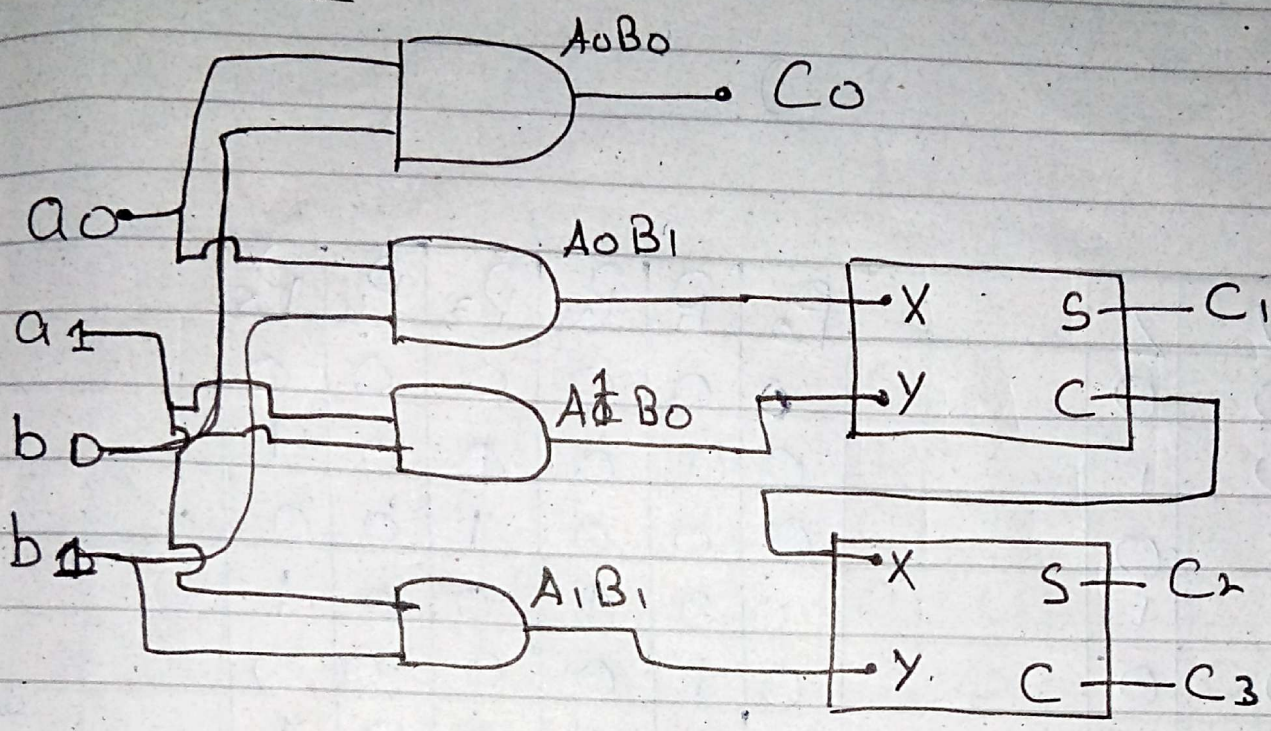
4.6



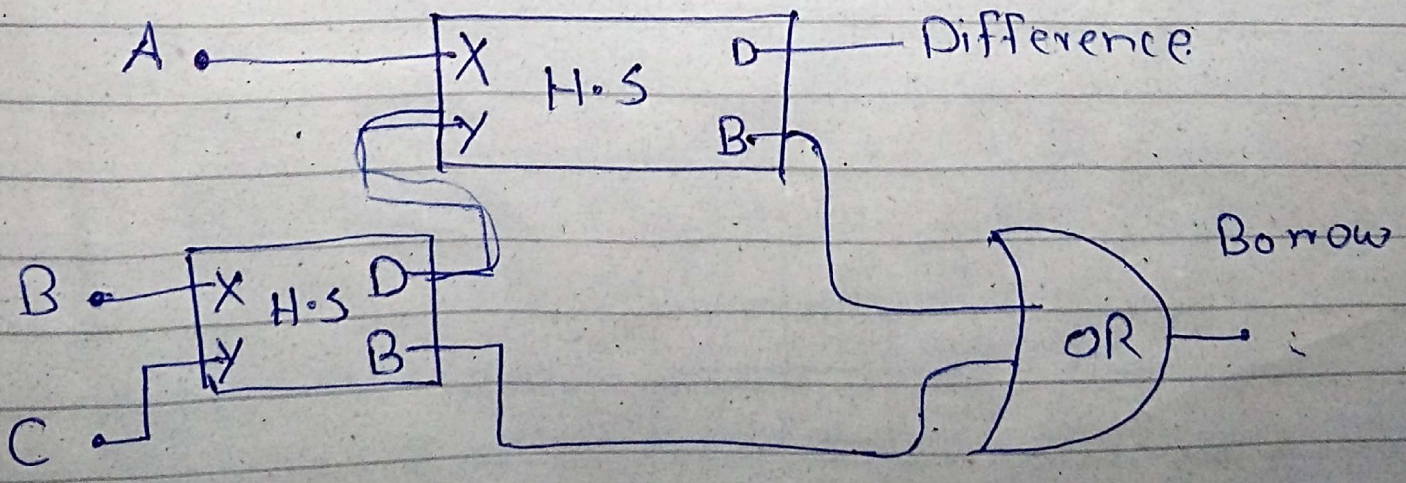
4.7

$a_1$	$a_0$	$b_0$	$b_1$		$c_3$	$c_2$	$c_1$	$c_0$
0	0	0	0		0	0	0	0
0	0	0	1		0	0	0	0
0	0	1	0		0	0	0	0
0	1	0	1		0	0	0	0
0	1	0	0		0	0	0	0
0	1	1	0		0	0	0	0
1	0	0	0		0	0	1	0
1	0	0	1		0	0	0	0
1	0	1	0		0	0	0	0
1	0	1	1		0	0	0	0
1	1	0	0		0	1	0	0
1	1	0	1		0	0	0	0
1	1	1	0		0	0	0	0
1	1	1	1		0	0	0	0
1	1	1	1		1	0	0	0
1	1	1	1		0	1	0	0
1	1	1	1		0	0	1	0
1	1	1	1		0	0	0	1
1	1	1	1		1	1	1	1

4.7  
Circuit



4.8



4.9

X	Y	Z	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>
0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1
0	1	0	0	0	0	1	0	0
0	1	1	0	0	1	0	0	1
1	0	0	0	1	0	0	0	0
1	0	1	0	1	1	0	0	1
1	1	0	1	0	0	1	0	0
1	1	1	1	1	0	0	0	1



4.10

9's complement

BCD				9's complement			
A	B	C	D	W	X	Y	Z
0	0	0	0	1	0	0	1
0	0	0	1	1	0	0	0
0	0	1	0	0	1	1	1
0	0	1	1	0	1	1	0
0	1	0	0	0	1	0	1
0	1	0	1	0	1	0	0
0	1	1	0	0	0	1	1
0	1	1	1	0	0	1	0
1	0	0	0	0	0	0	1
1	0	0	1	0	0	0	0
1	0	1	0	x	x	x	x
1	0	1	1	x	x	x	x
1	1	0	0	x	x	x	x
1	1	0	1	x	x	x	x
1	1	1	0	x	x	x	x
1	1	1	1	x	x	x	x

For

W	CD	00	01	11	10
AB	00	1	1		
	01				
	11	x	x	x	x
	10			x	x

$$W = \bar{A}\bar{B}\bar{C}$$

(11)

For X

CD	00	01	11	10
AB <sup>00</sup>			1	1
01	1	1		
11	X	X		
10			X	X

$$X = B\bar{C} + \bar{B}C = B \oplus C$$

For Y

CD	00	01	11	10
AB <sup>00</sup>			1	1
01			1	1
11			X	X
10			X	X

$$Y = C$$

For Z

CD	00	01	11	10
AB <sup>00</sup>	1			1
01	1			1
11	X	X	X	X
10	1		X	X

$$Z = \bar{D}$$

# Circuit

