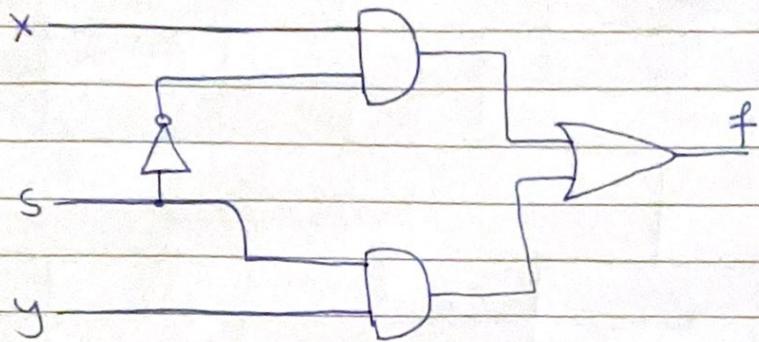


ARYAN RAO  
SECTION 11 / /  
264954748

## HOMEWORK 7

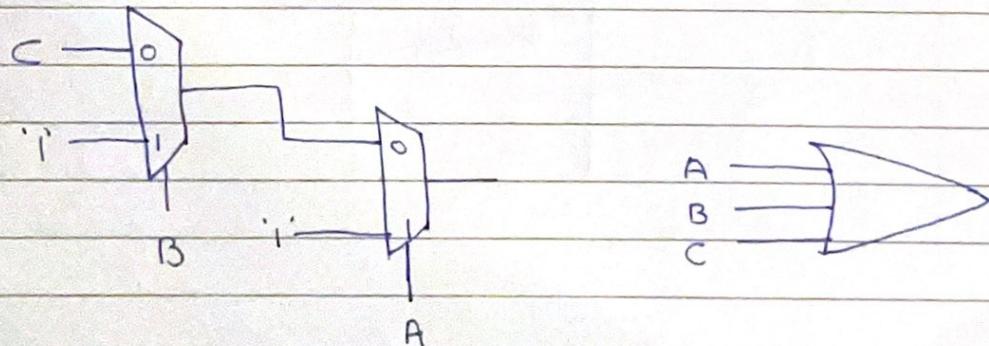
P1. a.



$$\cancel{y} = (s + \cancel{y}) (\cancel{s} + \cancel{x}) = s + y$$

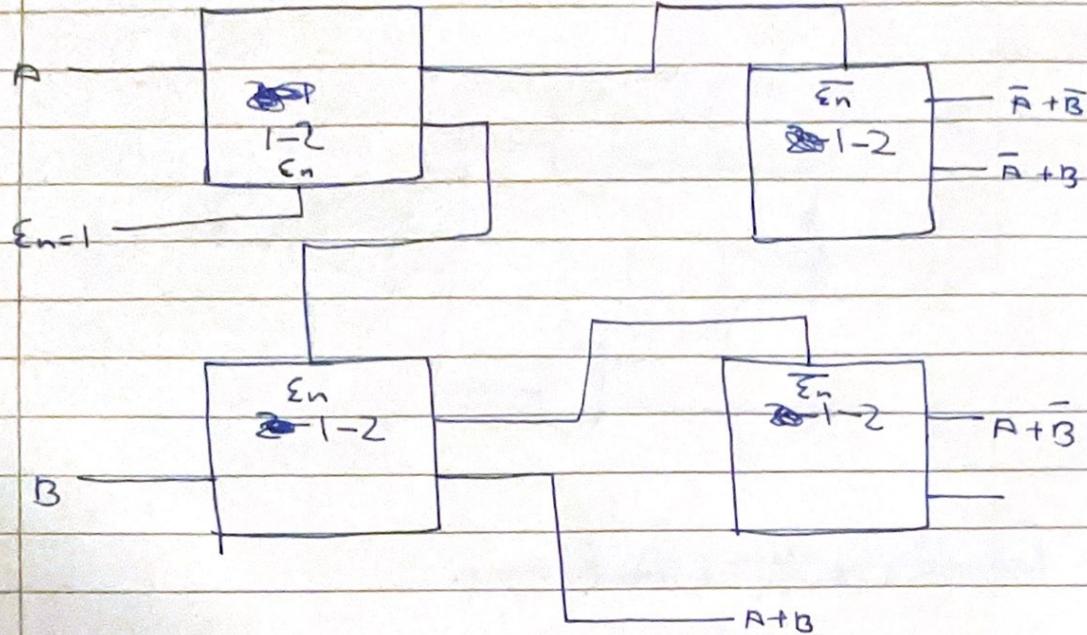
b.  $(s + x)(\cancel{s} + y)$

P2. a

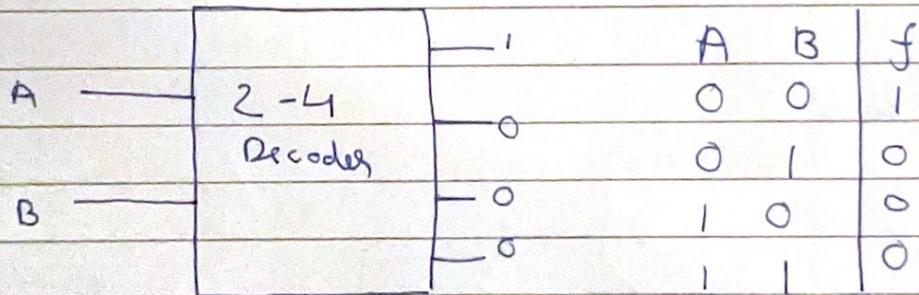


A	B	F
0	0	0
0	1	1
1	0	1
1	1	1

b.



c.



- P3.
- 5 decoders
  - 9 decoders
  - 7 MUX's
  - 8 MUX's

P4.	A	B	C	Out
	0	0	0	$y_0$
	0	0	1	$y_1$
	0	1	0	$y_2$
	0	1	1	$y_3$
	1	0	0	$y_{45}$
	1	0	1	$y_5$
	1	1	0	$y_6$
	1	1	1	$y_7$

A.  $A = 1, Y_4, Y_5, Y_6, Y_7$

$$A = \bar{W}\bar{X}\bar{Y} + W\bar{X} + Y\bar{Z}\bar{W}$$

	WZ	00	01	11	10
00	1	0	0	1	0
01	1	1	0	1	0
11	0	1	1	0	0
10	1	0	1	0	0

B.  $B = 1, Y_2, Y_3, Y_6, Y_7$

$$B = \bar{Y}\bar{Z} + XY + \bar{W}YZ$$

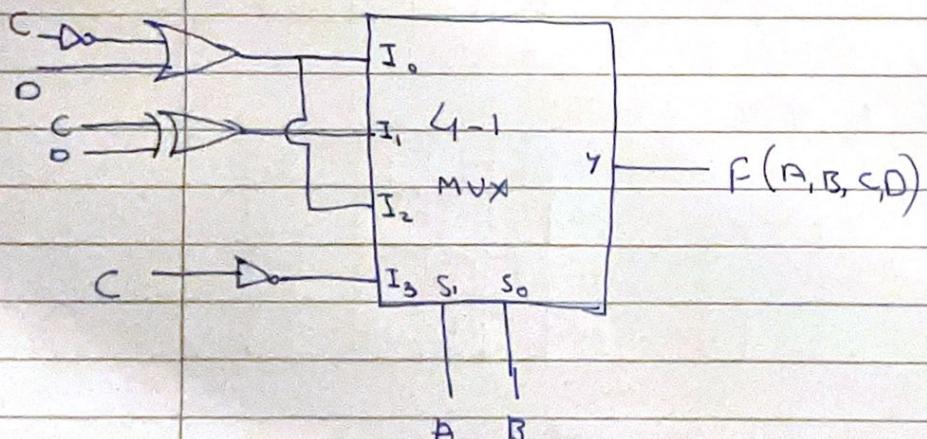
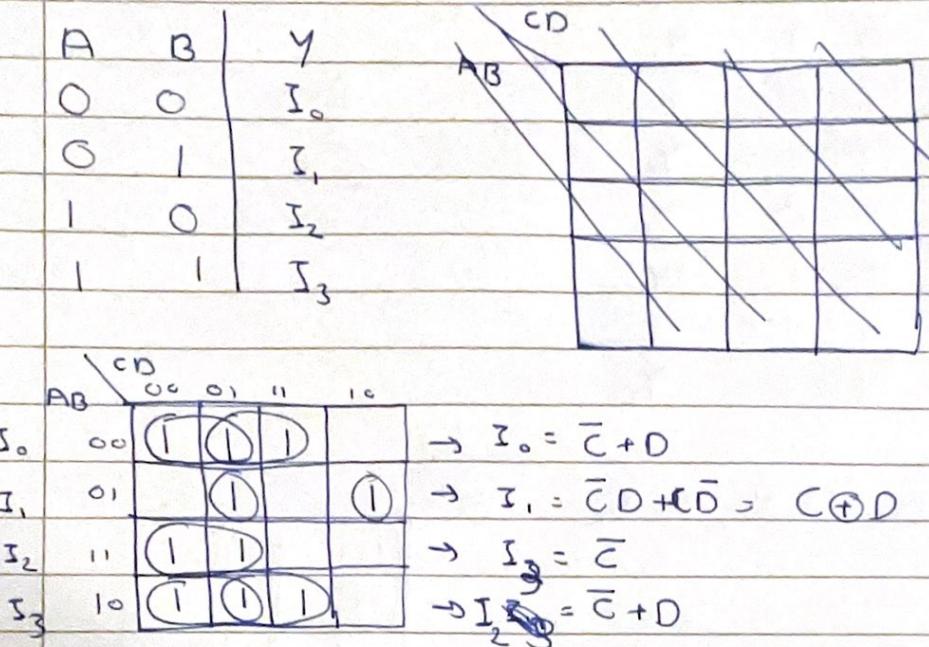
	WZ	00	01	11	10
00	1	1	1	1	0
01	0	0	0	0	0
11	1	0	1	0	0
10	0	1	0	0	0

C.  $C = 1, Y_1, Y_2, Y_5, Y_7$

$$C = \bar{W}Z + \bar{X}Z + \bar{W}\bar{X}\bar{Z} + W\bar{X}\bar{Z}$$

	WZ	00	01	11	10
00	1	0	0	1	0
01	1	1	0	1	0
11	0	1	1	0	0
10	1	0	1	0	0

$$P5.a. \quad F(A, B, C, D) = \sum_m(0, 1, 3, 5, 6, 8, 9, 11, 12, 13)$$



- / -

b.  $F(A, B, C, D) = \Sigma m(0, 7, 8, 9, 10, 11, 15)$

B	C	Y
0	0	I <sub>0</sub>
0	1	I <sub>1</sub>
1	0	I <sub>2</sub>
1	1	I <sub>3</sub>

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

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

$$CD\bar{B} +$$

$$A\bar{B}$$

$$I_0 = A + \bar{D}$$

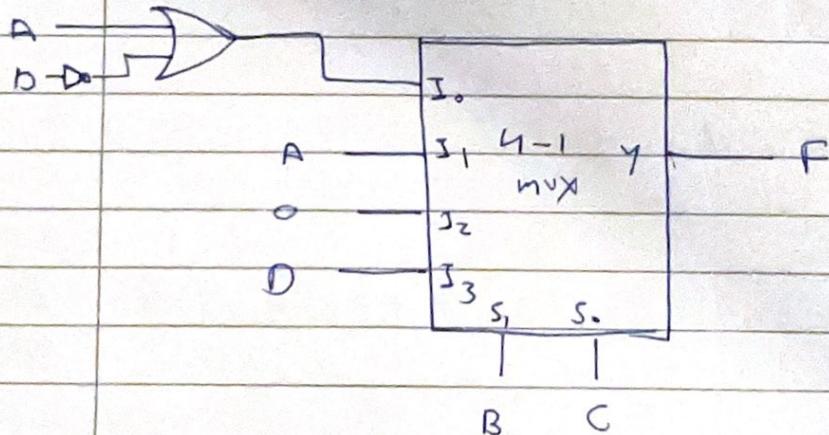
[Shannon's]

$$I_1 = A$$

$$I_2 = 0$$

$$I_3 = D$$

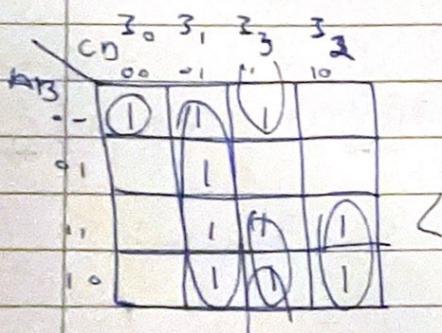
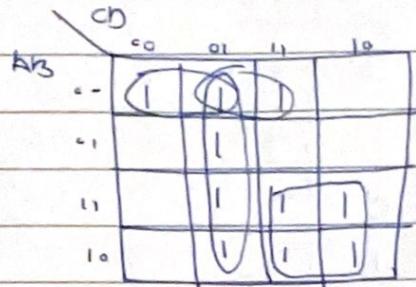
A	B	C	D	A Y D	F
0	0	0	0	0	1
0	0	0	1	0	0
0	0	1	0	0	0
0	0	1	1	0	0
0	1	0	0	0	0
0	1	0	1	0	0
0	1	1	0	0	0
0	1	1	1	0	0
1	0	0	0	1	1
1	0	0	1	1	1
1	0	1	0	1	1
1	0	1	1	1	1
1	1	0	0	1	0
1	1	0	1	1	0
1	1	1	0	1	0
1	1	1	1	1	1



— / —

$$\text{c. } F(A, B, C, D) = \prod M(2, 4, 6, 7, 8, 12) \\ = \sum m(0, 1, 3, 5, 9, 10, 11, 13, 14, 15)$$

C	D	Y
0	0	I <sub>0</sub>
0	1	I <sub>1</sub>
1	0	I <sub>2</sub>
1	1	I <sub>3</sub>



$$= \overline{CD} + CA + \overline{AB}\overline{C} + \overline{A}\overline{B}D$$

C & D Select lines

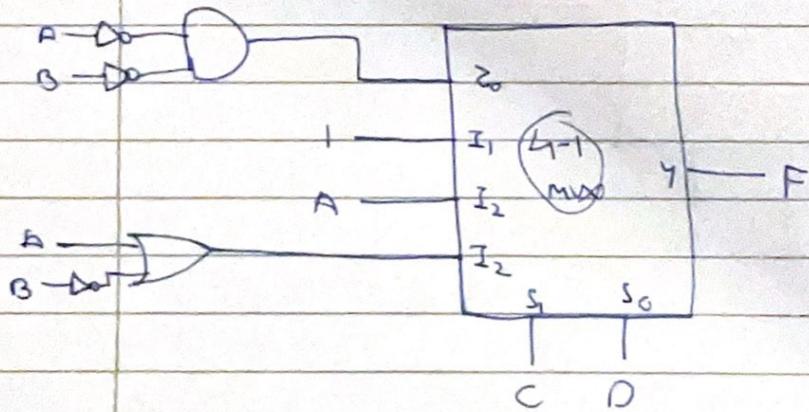
Shannons:

$$I_0 = \overline{A}\overline{B}$$

$$I_1 = A$$

$$I_2 = \overline{A}$$

$$I_3 = A + \overline{B}$$



d  $F(A, B, C, D) = \Pi_M(0, 2, 3, 4, 5, 6, 7, 10, 11)$   
 $= \Sigma_M(1, 8, 9, 12, 13, 14, 15)$

A	0	Y
0	0	$Z_0$
0	1	$Z_1$
1	0	$Z_2$
1	1	$Z_3$

$AB \setminus CD$  (Shannon)

	00	01	11	10	
00	1	0			
01					
11	1	1	1	1	
10	1	1			

 $= \underline{\bar{A}\bar{B}\bar{C}D} + \underline{AB} + \underline{A\bar{B}\bar{C}}$ 

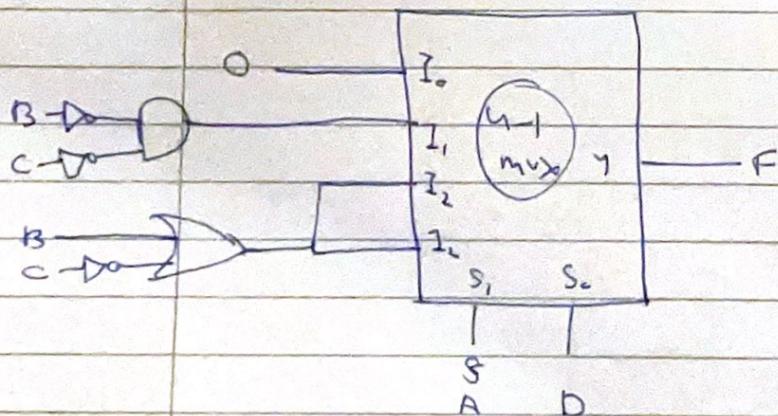
Using Shannon:

$Z_0 = 0$

$Z_1 = \bar{B}\bar{C}$

$Z_2 = B + \bar{C}$

$Z_3 = B + C$



P6. module priority(en, in, y);  
 input en;  
 input [7:0] in;  
 output [2:0] y;  
 reg [2:0] y;

always @ (in, en)  
 begin  
 case (in)

$$8'600000001 : y = 3'6000$$

$$8'60000001x : y = 3'6001$$

$$8'6000001xx : y = 3'6010$$

$$8'600001xxx : y = 3'6011$$

$$8'60001xxxx : y = 3'6100$$

$$8'6001xxxxx : y = 3'6101$$

$$8'601xxxxxx : y = 3'6110$$

$$8'61xxxxxxx : y = 3'6111$$

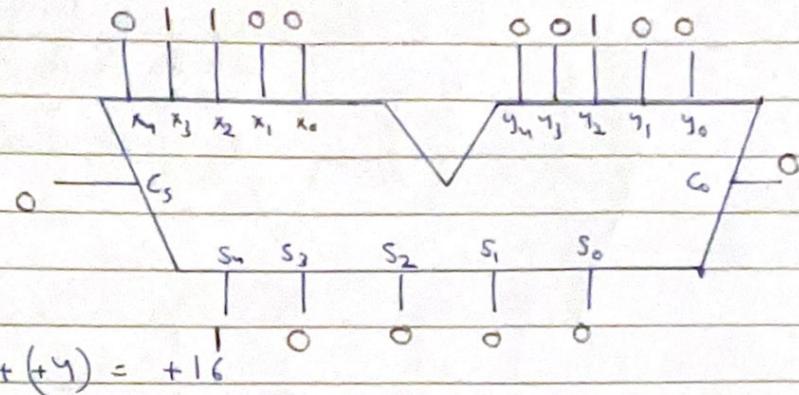
$$\text{default} : y = 3'6xxx$$

endcase

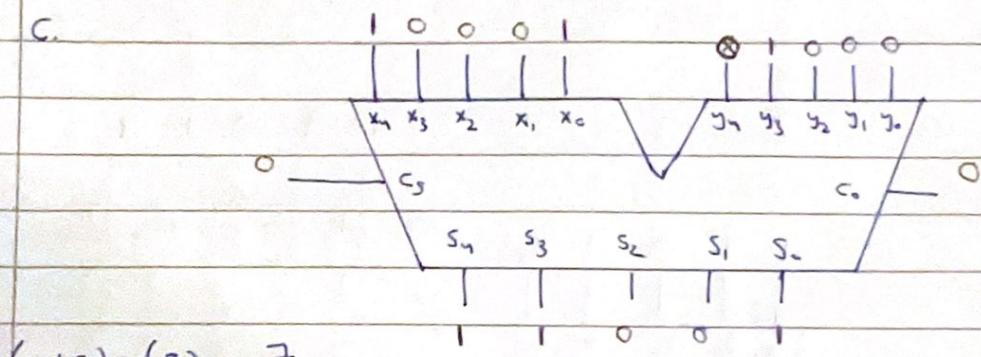
end

endmodule

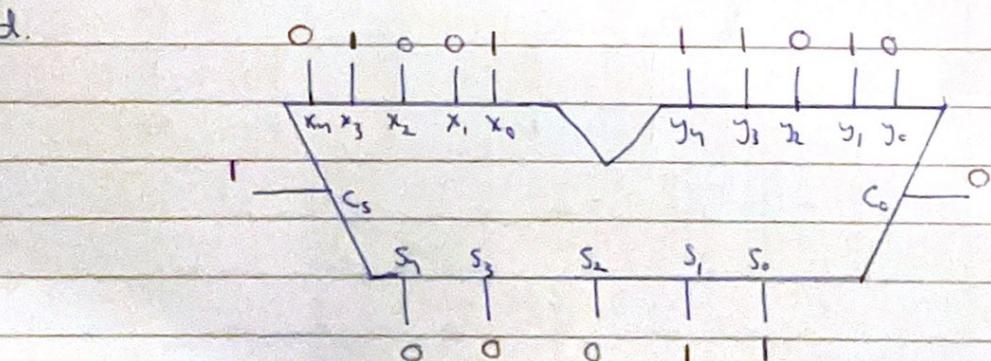
P7. b.



c.

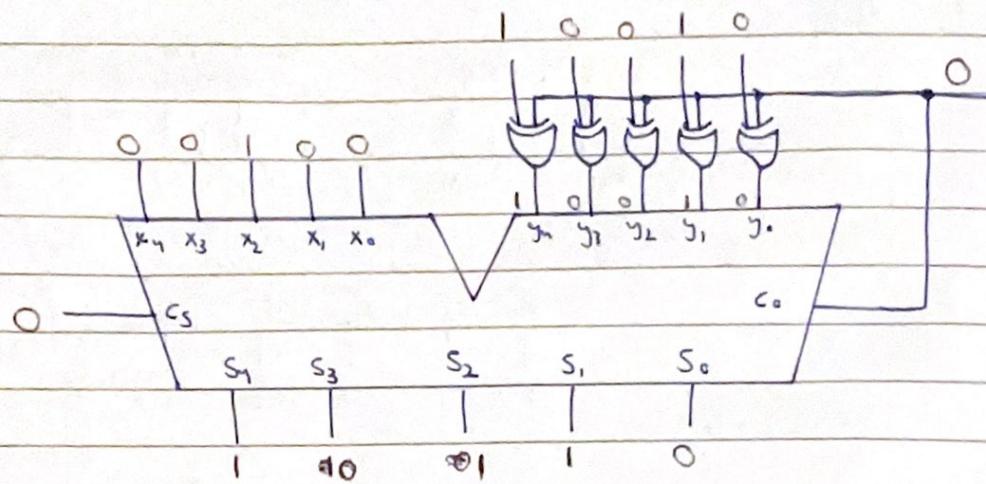


d.



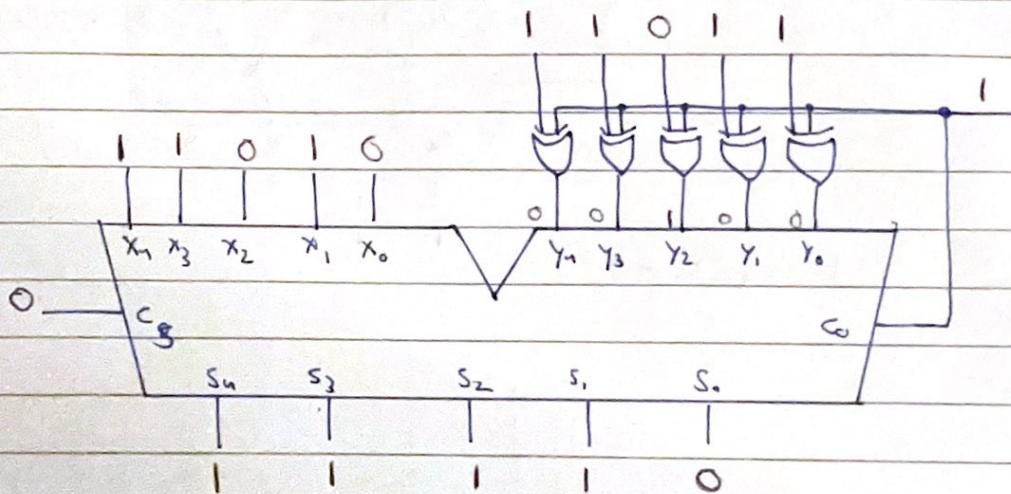
$$(+9) + (-6) = +3$$

e.



$$(+4) + (-14) = (-10)$$

f.



$$(-6) - (-5) = -1$$