

11/03/21

Pp4 Code - n

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Q1

(a) Sum of products form

$$Y = \bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}CD + \bar{A}B\bar{C}\bar{D} + \bar{A}BCD \\ + AB\bar{C}\bar{D} + AB\bar{C}D + ABC\bar{D}$$

$$= m_2 + m_3 + m_6 + m_7 + m_{12} + m_{13} + m_{14}$$

$$= \Sigma(2, 3, 6, 7, 12, 13, 14)$$

(b) K-map

		CD			
		00	01	11	10
AB	00			1	1
	01			1	1
AB	11	1	1		1
	10				

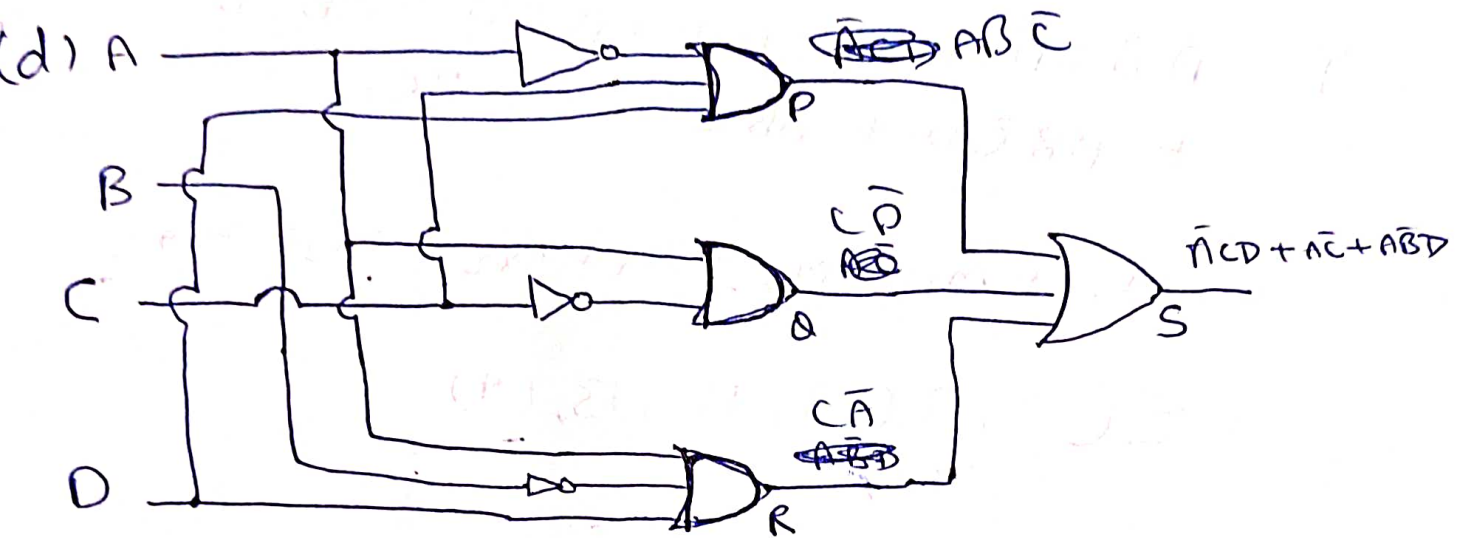
$\bar{A}\bar{B}\bar{C}\bar{D}$ (cell 00, 00)
 $\bar{A}\bar{B}CD$ (cell 00, 10)
 $\bar{A}B\bar{C}\bar{D}$ (cell 11, 00)
 $\bar{A}BCD$ (cell 11, 10)
 $AB\bar{C}\bar{D}$ (cell 10, 00)
 $AB\bar{C}D$ (cell 10, 10)
 $ABC\bar{D}$ (cell 11, 00)

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(c) The Sum of products form can be written as

$$Y = \cancel{A\bar{C}} + \cancel{ACD} + \cancel{ABD} + AB\bar{C} + C\bar{D} + C\bar{A}$$



(e)

A	B	C	D	P	Q	R	S
0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0
1	0	0	0	0	0	0	0
1	1	1	1	0	0	0	0

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DLD

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End Sem Exam

Q-2

Truth Table

Input			Output	
A	B	C _{in}	S	C _{out}
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

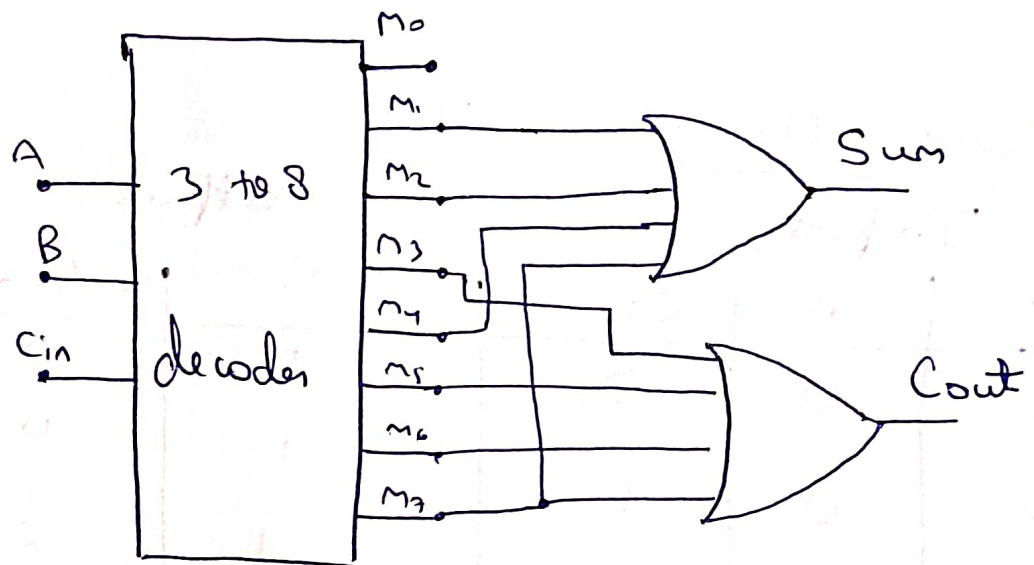
$$f_S(\text{Sum}) = \Sigma(m_1, m_2, m_4, m_7)$$

$$f_{\text{out}}(\text{Carry out}) = \Sigma(m_3, m_5, m_6, m_7)$$

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Assuming a 3 to 8 decoder where A, B, C_{in} are inputs and $m_0, m_1, m_2, \dots, m_7$ are the outputs.



Full adder using decoder

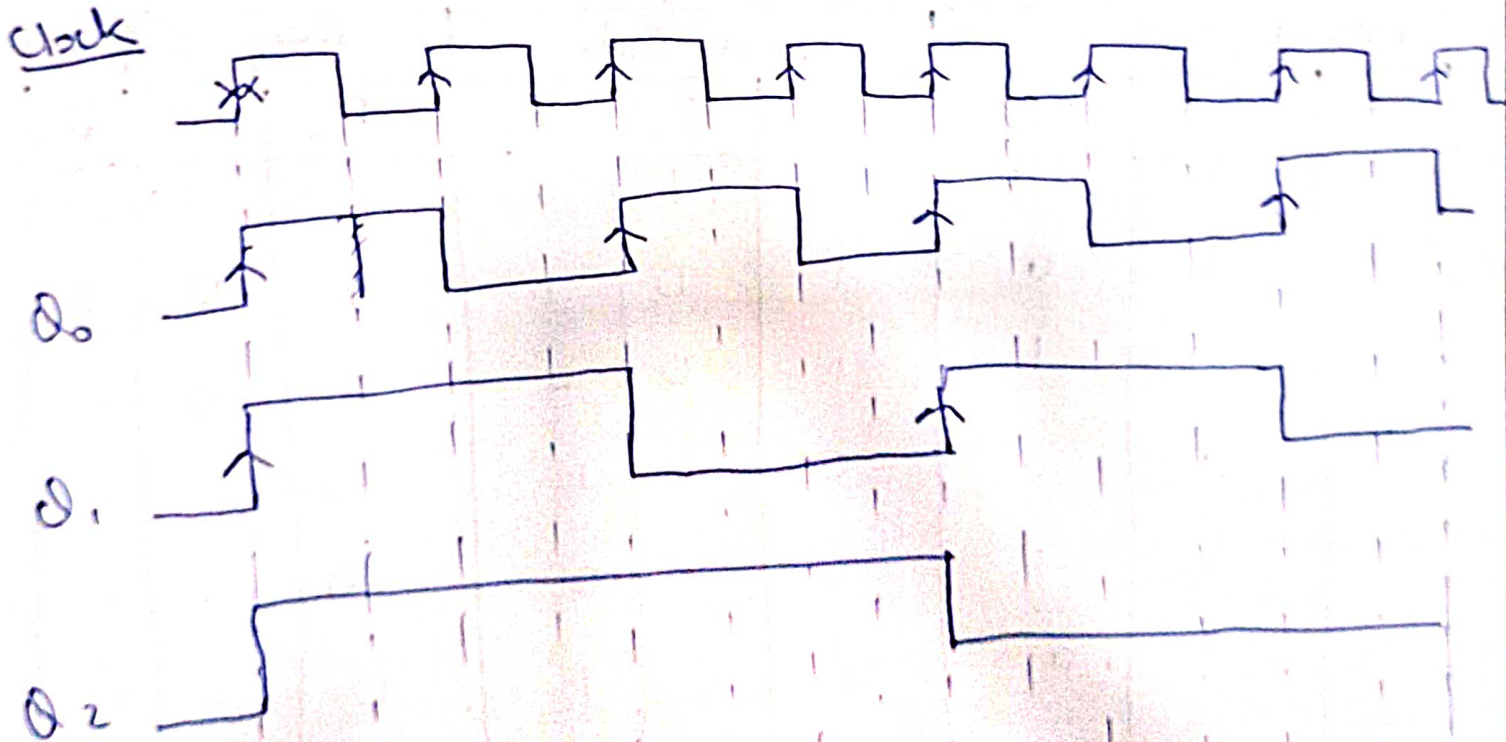
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Q.3 (continue)

The select pins are 01, the universal shift register performs shift register operation

Q.4 Timing diagram

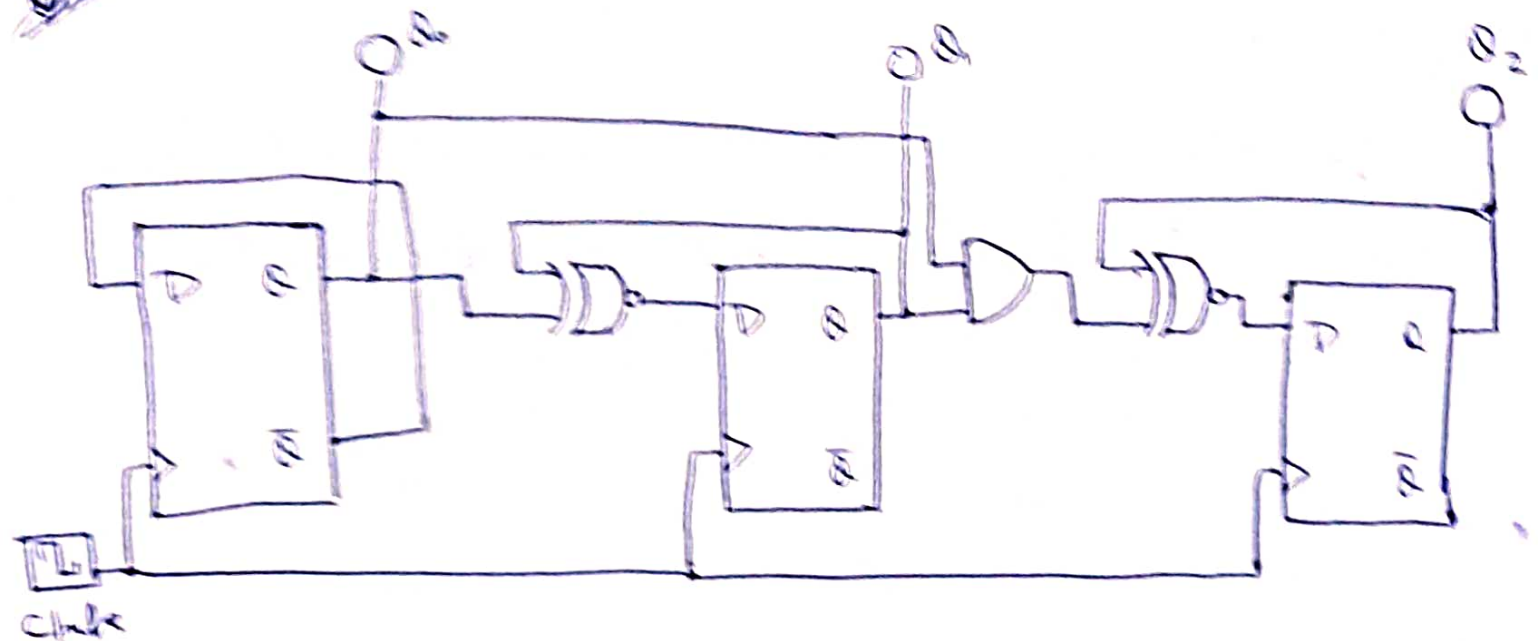


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Ques



3-bit Synchronous Down Counter

Present State			Next State			Req. Inputs		
Q ₂	Q ₁	Q ₀	Q ₂	Q ₁	Q ₀	D ₂	D ₁	D ₀
1	1	1	1	1	0	1	1	0
1	1	0	1	0	1	1	0	1
1	0	1	1	0	0	1	0	0
1	0	0	0	1	1	0	1	1
0	1	1	0	1	0	0	1	0
0	1	0	0	0	1	0	0	1
0	0	1	0	0	0	0	0	0
0	0	0	1	1	1	1	1	1

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Excitation table

PS	NS	D
0	0	0
0	1	1
1	0	0
1	1	1

K map P_2

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

K map P_1

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

K map P_0

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

$$P_0 = \overline{D_1}$$

$$P_2 = \overline{D_2} \overline{D_1} \overline{D_0} + D_2 D_1 + D_2 D_0$$

$$P_1 = \overline{D_1} \overline{D_0} + D_1 D_0$$