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Q.P. Code - 39546

Q.1 a) If $F(A,B,C) = \sum m(0,3,5,7)$ with its truth table and express F in SOP and POS form
 $F(A,B,C) = \sum m(0,3,5,7)$
 SOP form : $F(A,B,C) = \bar{A}\bar{B}\bar{C} + \bar{A}BC + A\bar{B}C + ABC$
 POS form
 $F(A,B,C) = \prod M(1,2,4,6)$
 $= (A+B+\bar{C}) \cdot (A+\bar{B}+C) \cdot (\bar{A}+B+C) \cdot (\bar{A}+\bar{B}+C)$

b) Perform the following operation using 2's complement

i) $(7)_{10} - (15)_{10}$

Ans. $CY = 0$ $(1000)_2$

Result is negative and magnitude is in 2's complement form

ii) $(50)_{10} - (2A)_{16}$

Ans. $CY = 1$ $(0000\ 1000)_2$

Result is positive and magnitude is in binary form.

Q.2 a) Implement following Boolean function using 8:1 multiplexer

$$F(A,B,C,D) = \bar{A}B\bar{D} + ACD + \bar{B}CD + \bar{A}\bar{C}D$$

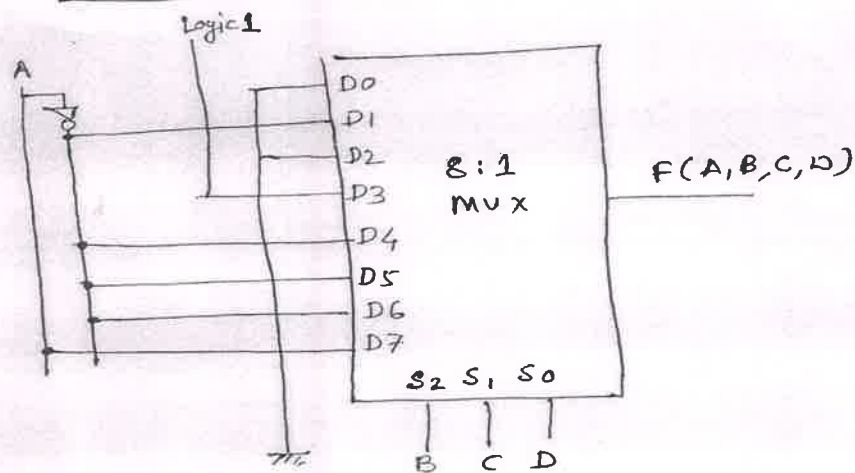
$$F(A,B,C,D) = \bar{A}B\bar{D} + ACD + \bar{B}CD + \bar{A}\bar{C}D$$

Converting above equation to standard form we obtain

$$F(A,B,C,D) = \sum m(1,3,4,5,6,11,15)$$

To implement using 8:1 Mux

I/P	D0	D1	D2	D3	D4	D5	D6	D7
\bar{A}	0	①	2	③	④	⑤	⑥	7
A	8	9	10	⑪	12	13	14	⑫
I/P to MUX	0	\bar{A}	D	1	\bar{A}	\bar{A}	\bar{A}	A



Q2 b) Design 3 bit Binary to Gray code Converter

Equations

$$g_0 = b_0 \oplus b_1$$

$$g_1 = b_1 \oplus b_2$$

$$g_2 = b_2$$

Circuit

Fig: 3-bit Binary to Gray code Converter

Q.4 b). Convert T flip flop to D flip flop.*

	Q_n	0	1
0		0 ⁰	1 ¹
1		1 ³	0 ²

$$T = D\bar{Q}_n + \bar{D}Q_n$$

$$= D \oplus Q_n$$

c) Minimize the following expression using Quine McClusky Technique

$$F(A, B, C, D) = \sum m(1, 3, 7, 9, 10, 11, 13, 15)$$

$$F(A, B, C, D) = \sum m(1, 3, 7, 9, 10, 11, 13, 15)$$

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

Grouping of minterms is essential using Quine McCluskey Technique.

Q.5 b) Convert $(532.125)_8$ into decimal, binary and hexadecimal.*

(i) Octal to Binary

$$(532.125)_8 = (101011010.001010101)_2$$

(ii) Octal to Decimal

$$(532.125)_8 = (346.166015625)_{10}$$

(iii) Octal to Hex

$$(532.125)_8 = (15A.2A8)_{16}$$

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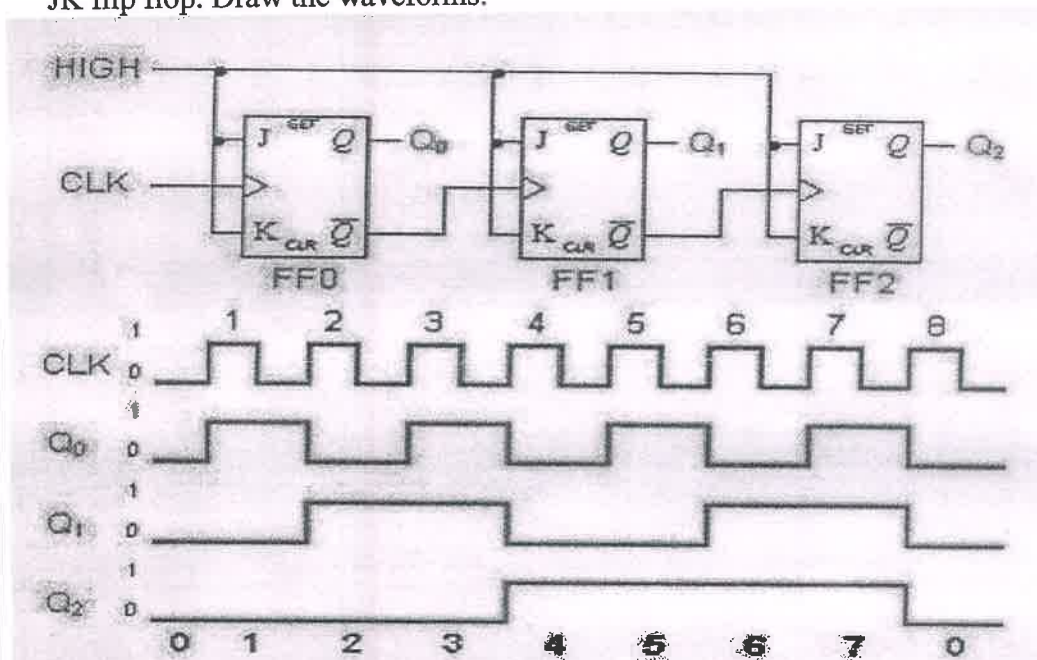
c) Explain Full Adder circuit using PLA having three inputs, 8 product terms and two outputs.

$$S = \bar{A}\bar{B}\bar{C}_{in} + \bar{A}B\bar{C}_{in} + A\bar{B}\bar{C}_{in} + ABC_{in}$$

$$C_{out} = AB + BC_{in} + AC_{in}$$

Diagram of programmed PLA to implement above equation

Q.6 b) Draw and explain 3 bit asynchronous binary counter using positive edge triggered JK flip flop. Draw the waveforms.



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