INTRODUCTION TO COMPUTER SYSTEMS (IT1020)

Year 1, Semester 1

Practical Answer Submission 5

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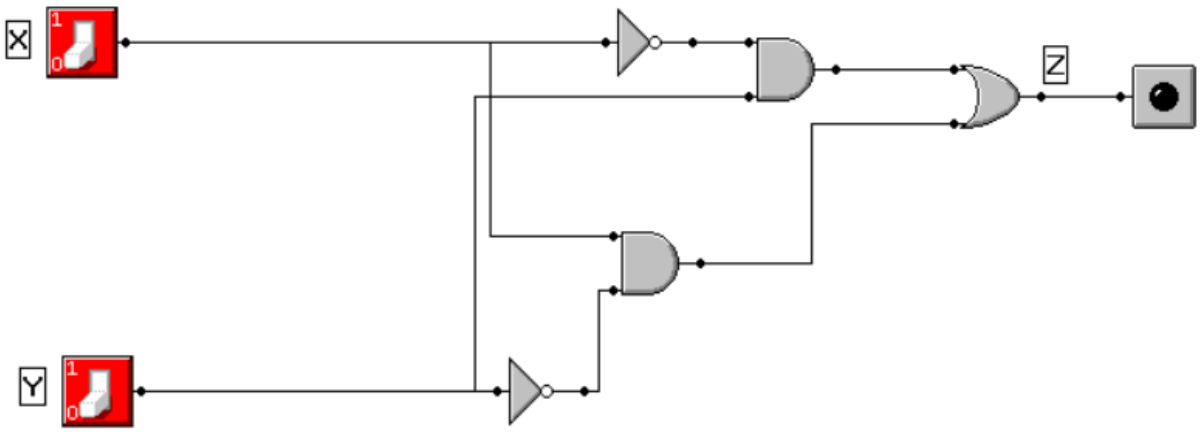
<5.2>

10/24/2022

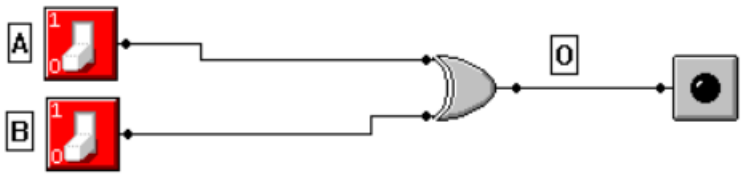
1) Draw truth tables and compare

i)



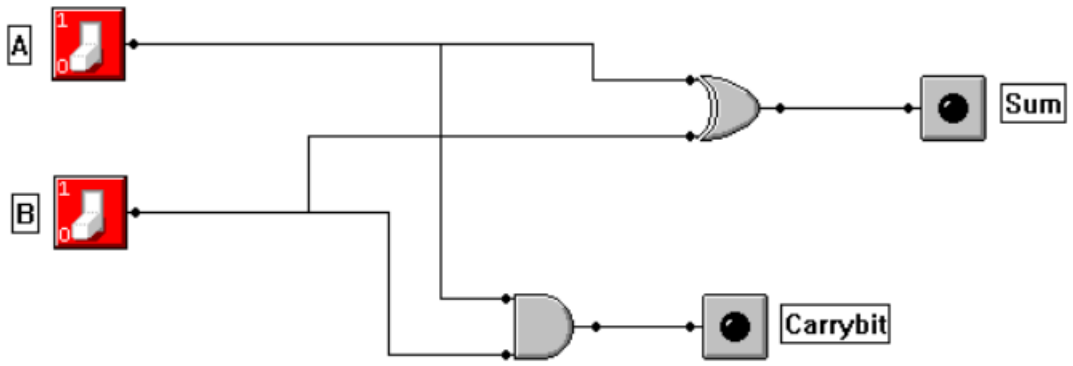
X	Y	Z
0	0	0
0	1	1
1	0	1
1	1	0

a)



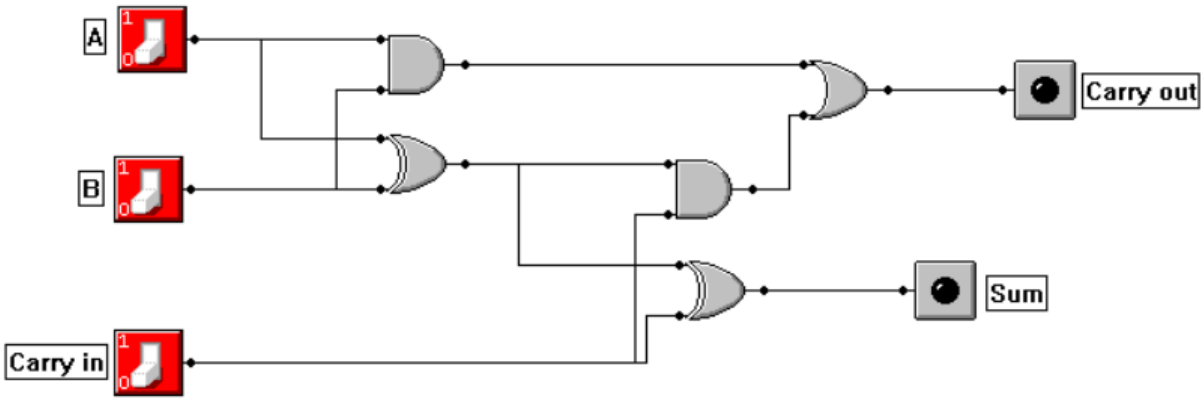
A	B	O
0	0	0
0	1	1
1	0	1
1	1	0

ii) Half Adder



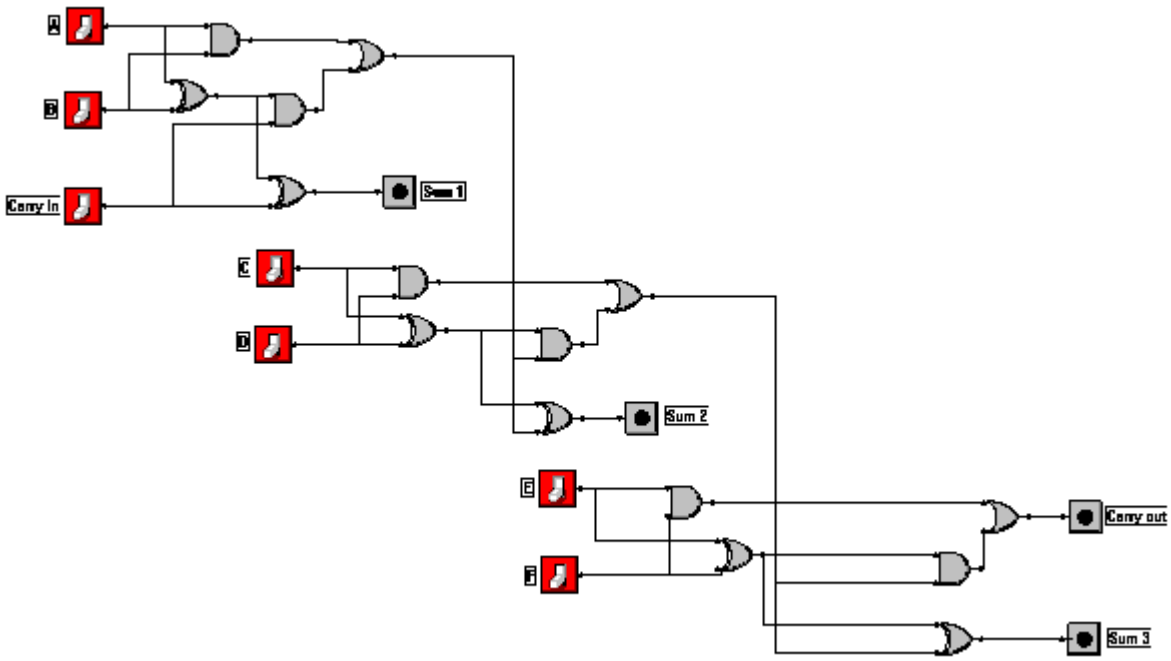
A	B	Sum	Carrybit
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

iii) Full Adder (Using 2 Half Adders)

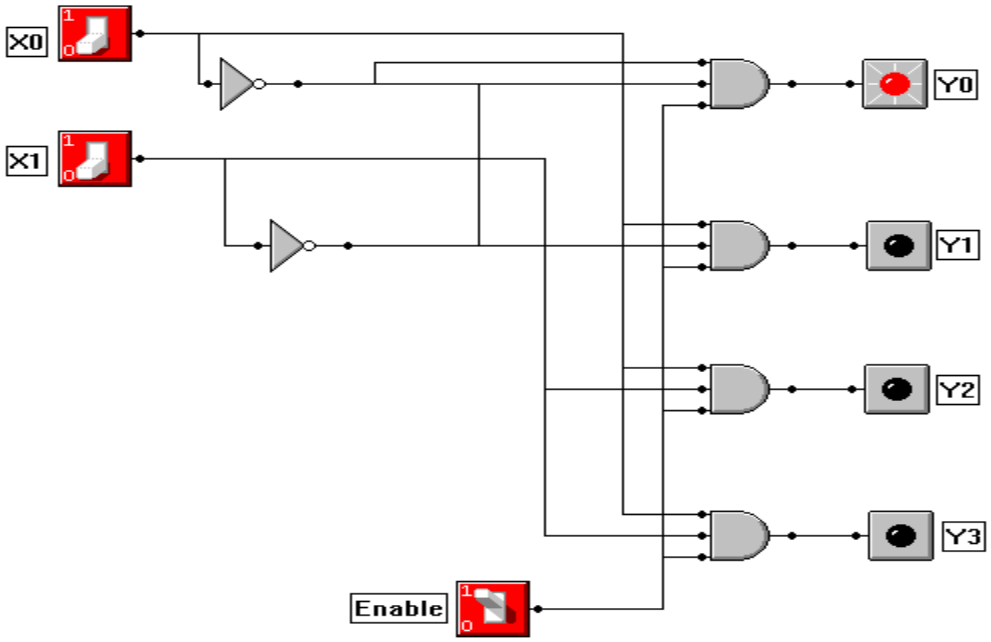


A	B	Carry in	Carry out	Sum
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

2)Parallel Adder

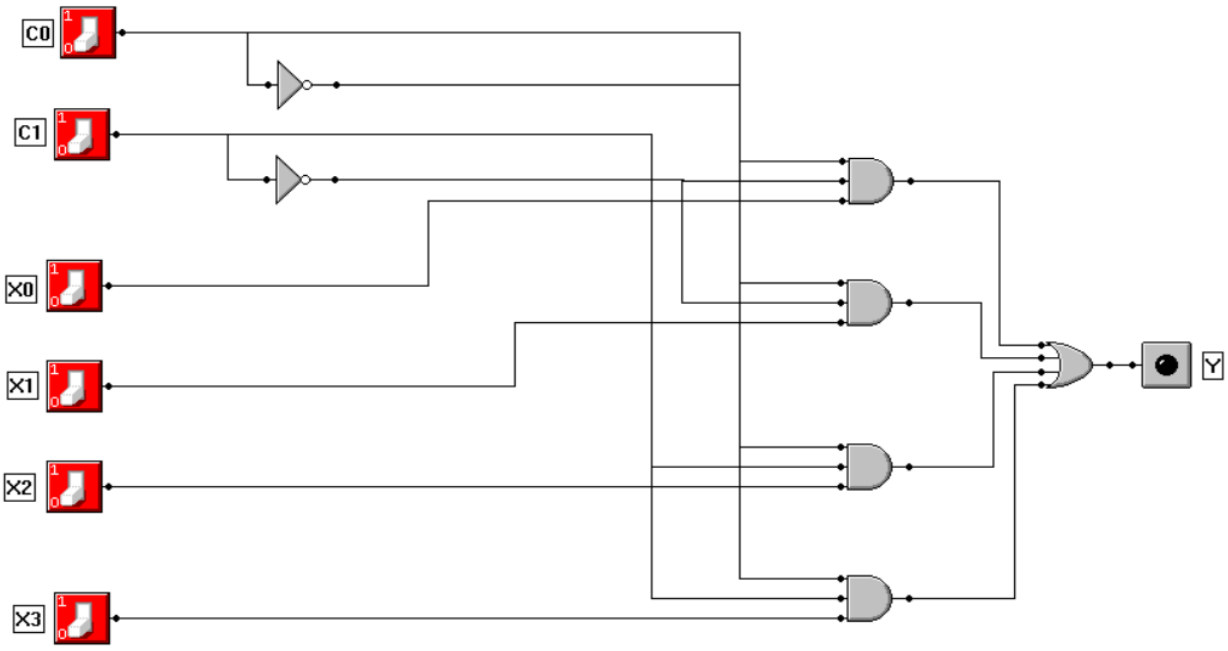


2) Binary Decoder



X0	X1	Y0	Y1	Y2	Y3
0	0	0	0	0	0
0	1	1	0	0	0
1	0	0	0	0	0
1	1	0	0	1	0

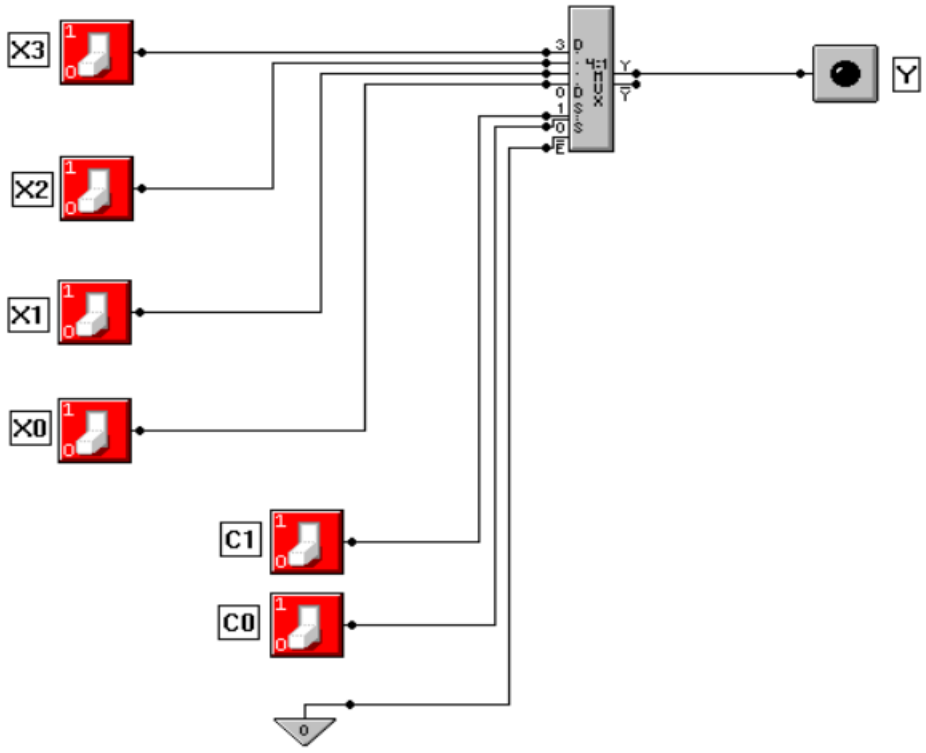
3) Multiplexer



C1	C0	X		Y
0	0	**X0**	0	0
			1	1
0	1	**X1**	0	0
			1	1
1	0	**X2**	0	0
			1	1
1	1	**X3**	0	0
			1	1

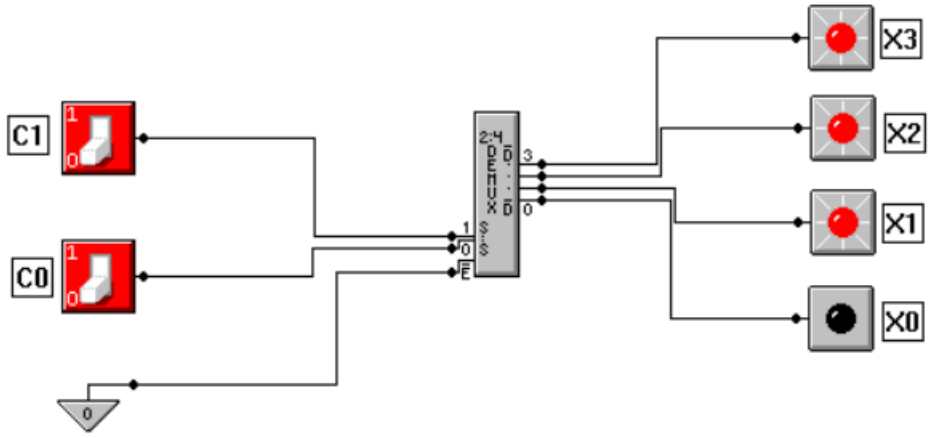
4) 4 to 1 mux and 2 to 4 De – mux

i) 4 to 1 mux



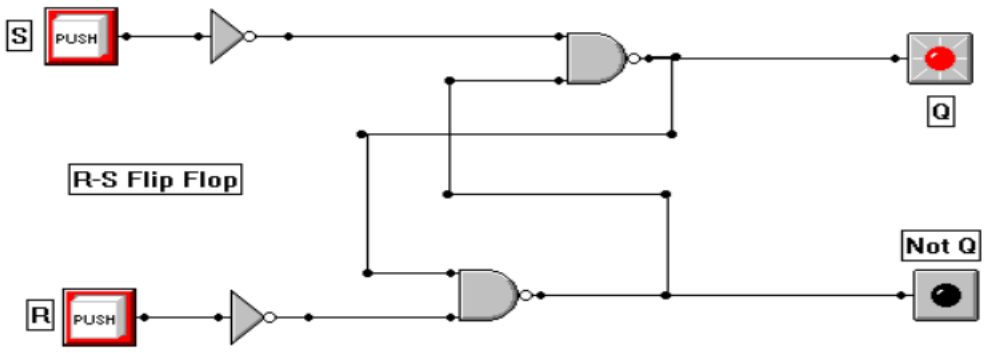
C1	C0	X		Y
0	0	**X0**	0	0
			1	1
0	1	**X1**	0	0
			1	1
1	0	**X2**	0	0
			1	1
1	1	**X3**	0	0
			1	1

ii) 2 to 4 De – mux



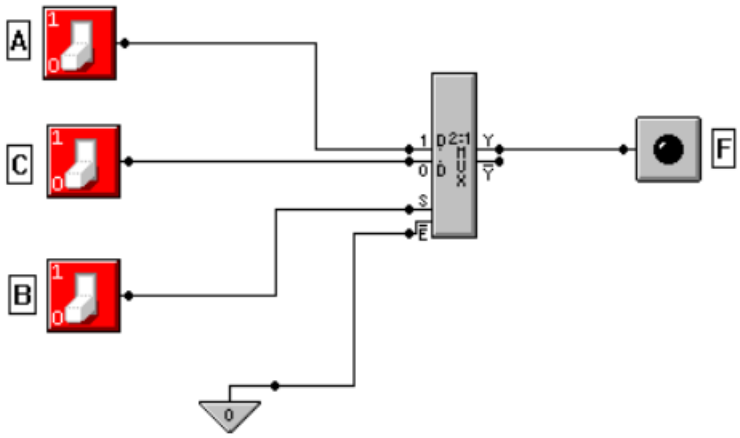
C1	C0	X0	X1	X2	X3
0	0	0	1	1	1
0	1	1	0	1	1
1	0	1	1	0	1
1	1	1	1	1	0

5) R-S Flip Flop



S	R	Q	Not Q
1	0	1	0
0	0	1	0
0	1	0	1
0	0	0	1

6) F = ABC’ + B’C + AC



7) Design a circuit to generate the parity bit using even parity scheme for a 3 - bit message.

A	B	C	O
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Using Sum Of Products (SOP) ;

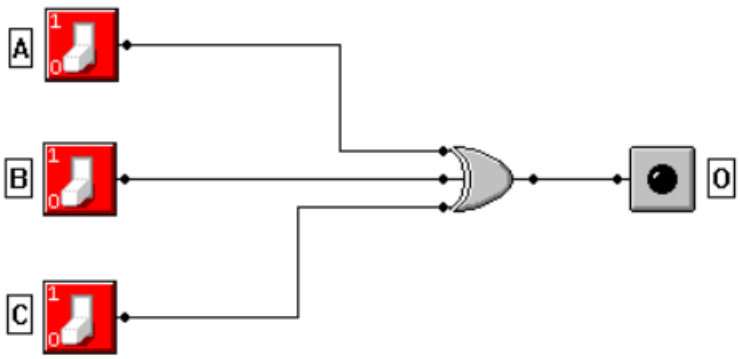
A'B'C + A'BC' + AB'C' + ABC

= A' (B'C + BC') + A (B'C' + BC)

= A'X + AX' {X = B'C + BC' , X' = B'C' + BC

= A ⊕ X

= A ⊕ B ⊕ C



8) Design a circuit to output whether the decimal numbers 0 – 7 , is a prime number or not.

A	B	C	O
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

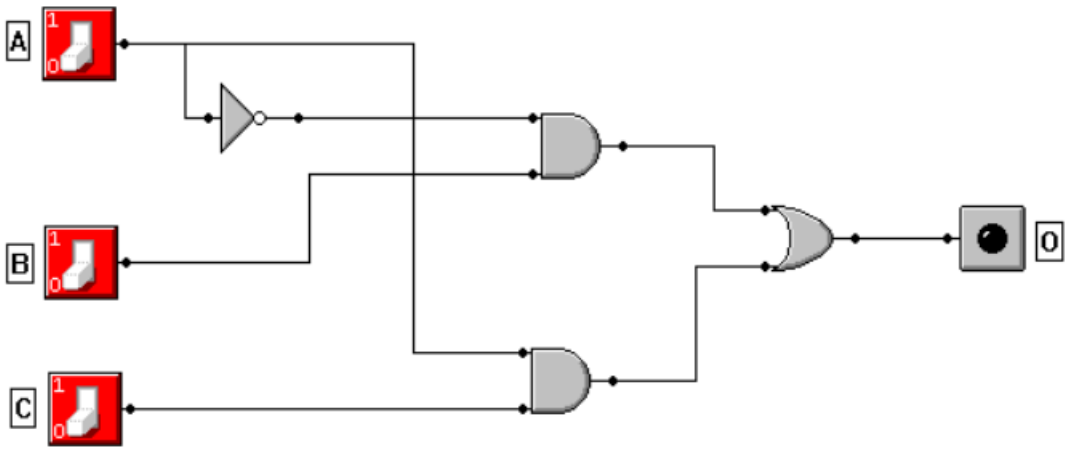
Using Sum Of Products (SOP) ;

A'BC' + A'BC + AB'C + ABC

= A'B (C' + C) + AC (B' + B) {Distributive Law}

= A'B (1) + AC (1) {Inverse Law}

= A'B + AC {Identity Law}



a) If the requirement is only to check decimal numbers 2 - 7

A	B	C	O
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

Using Product Of Sum (POS) ;

(A + B + C) (A + B + C')

= (A + B) + (C . C') {Distributive Law}

= (A + B) + (0) {Inverse Law}

= A + B {Identity Law}