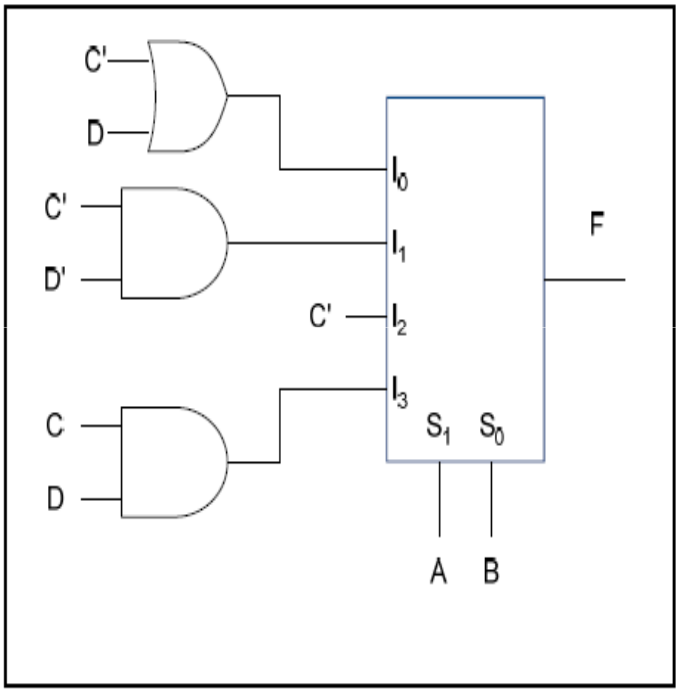
TUT-V

11.09.2012

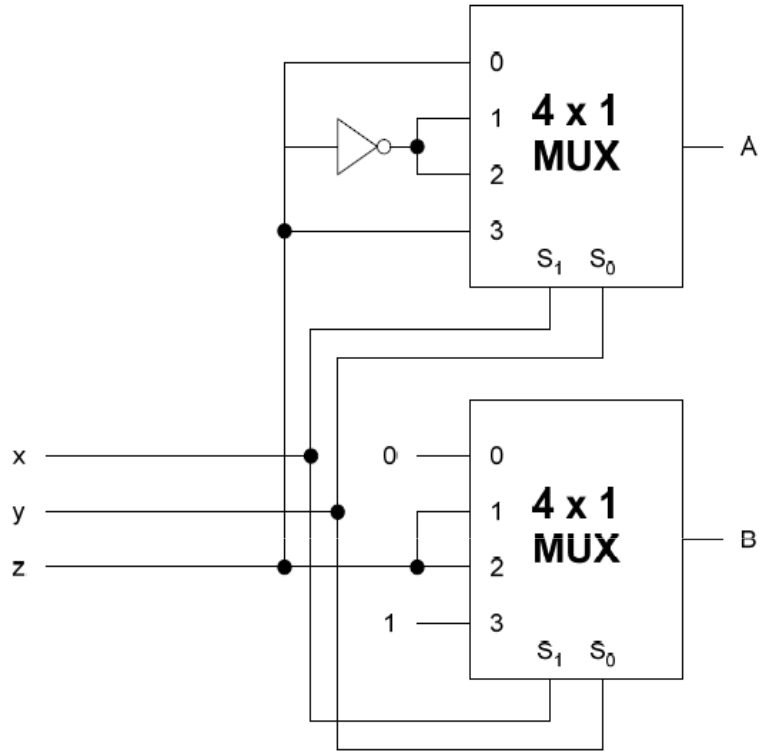
Q1:-Suppose you have a system with three buttons. Each button sends a logic 1 when the button is being pressed and a zero once it is released. The system should light an LED (by sending it a logic 1) whenever only one is button pressed at a time, and should turn off the LED (by sending it a logic 0) when more than one button is pressed. At least one button will always be pressed so we do not care what the circuit does when no buttons are pressed. Design a minimized circuit to control the LED.

Call the buttons A, B, and C. Prepare the truth table, where L is the LED signal.

Q2:-Implement the following Boolean function with a 4 x 1 multiplexer:
F(*A, B, C, D) = Σ (0, 1, 3, 4, 8, 9, 15)*



Q3:-Determine the outputs functions *A and B as sums of minterms.*



The circuit shown above has the functionality of a commonly used arithmetic component. What does the circuit do and what are other names for A and B?

Q.4:- A car seat belt interlock requires that the car should only start if the driver's seat belt is fastened and either the front passenger seat is unoccupied or the front passenger seat is occupied and the passenger seat belt is fastened.

i) Obtain the truth table of the system

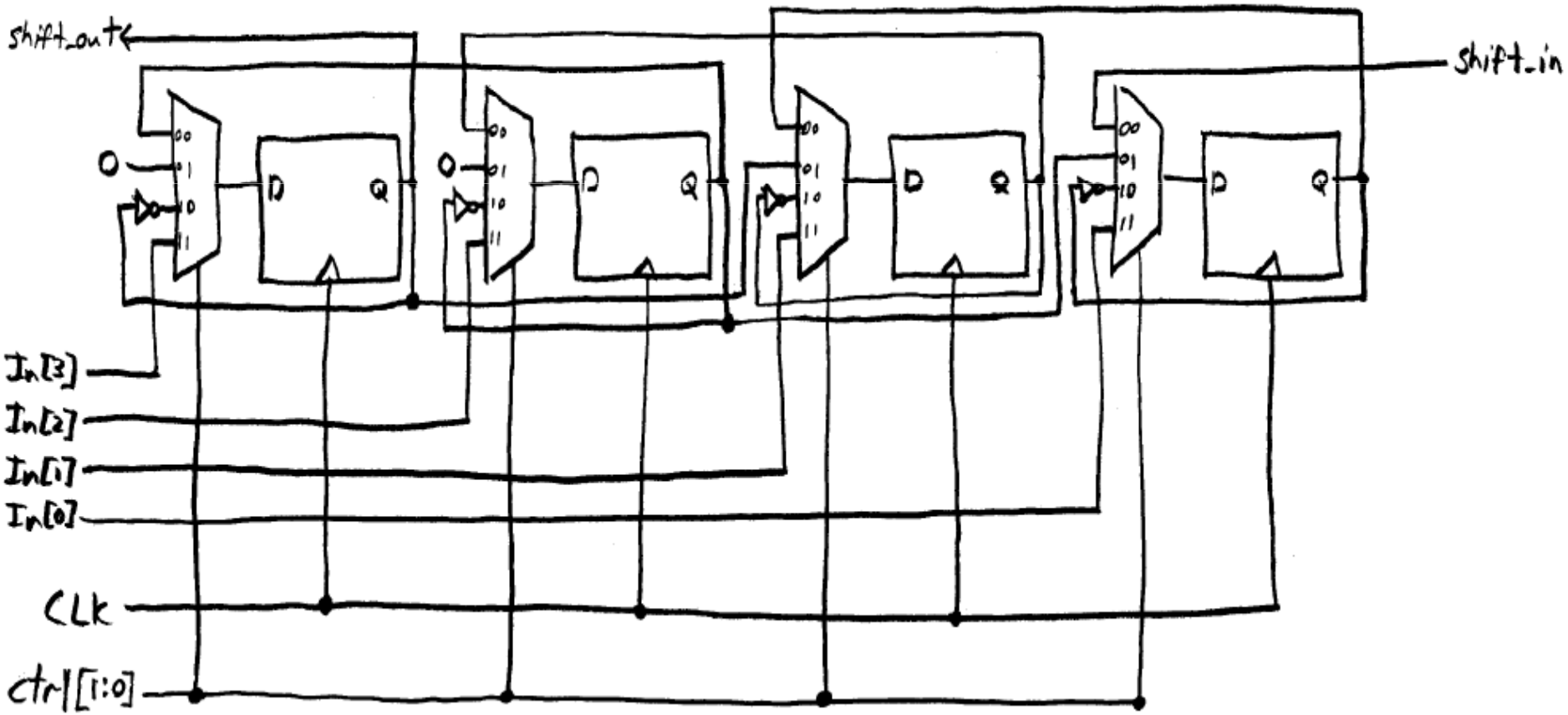
ii) Obtain the SOP Boolean expression for the system.

Iii) Implement this using a 8:1 mux

ANSWER: Assume

- Driver Occupied – D
- Passenger Occupied – P
- Driver Seat belt – B1
- Passenger Seat Belt – B2

Q5:- Design a 4-bit register that can shift left by one bit, shift right by two bits, invert its contents, and load a new value (respectively, ctrl = 00, 01, 10, 11). Provide a shift_in input and a shift_out output for use when left shifting. When right shifting, the register should shift in
zeros and the shift out should be ignored.



Q6:-Consider the following transition table:

IN	Q1	Q0	N1	N0	X	Y
0	0	0	0	1	1	1
0	0	1	1	1	1	1
0	1	0	0	0	0	0
0	1	1	1	0	0	0
1	0	0	1	0	0	1
1	0	1	0	0	0	1
1	1	0	1	1	1	0
1	1	1	0	1	1	0

Is X a Mealy or a Moore outputs? How about Y?

Notice that X is high when the current state Q1Q0 = 00 and IN = 0, but not when Q1Q0 = 00 and IN = 1. Therefore, it is a function of the current state *and the IN input.*

X is a Mealy output

Notice that Y is high whenever the current state Q1Q0 is 00 or 01. Therefore, it is a function of the current state only.

Y is a Moore output