Practical: 5

Aim: Design 4-bit Combinational Circuit Shifter.

Theory:

Shift micro-operations are used for serial transfer of data. They are also used in conjunction with arithmetic, logic and other data-processing operations. The contents of a register can be shifted to the left or the right. At the same time that the bits are shifted, the first flip-flop receives its binary information from the serial input. During a shift-left operation the serial input transfers a bit into the rightmost position. During a shift-right operation the serial in transfers a bit into the leftmost position.

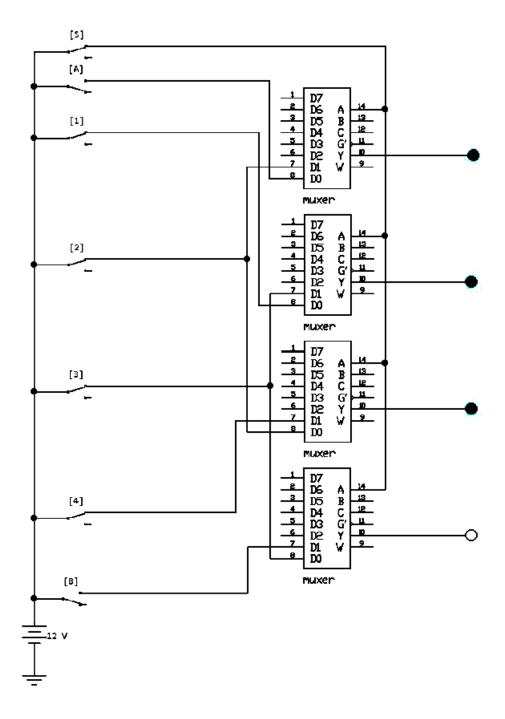| Select	Output			
S	H_0	H_1	H_2	H_3
0	I_R	A_0	A_1	A_2
1	A_1	A_2	A_3	I_L

Table: Function table

The content of a register that has to be shifted is first placed onto a common bus whose output is connected to the combinational shifter, and the shifted number is then loaded back into the register**.** A combinational circuit shifter can be constructed with multiplexers as shown in Fig A. The 4-bit shifter has four data inputs, A_o through A_3, and four data outputs, H_o through H_3. There are two serial inputs, one for shift left(I_L) and the other for shift right (I_R). When the selection input S = 0, the data are shifted right. When S = 1, the input data are shifted left. The function table shows input goes to each output after the shift. A shifter with n data input outputs requires n multiplexers.

Procedure:
1. Create the circuit as per function table.
2. Verify the function table for each operation.

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Circuit Diagram:

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