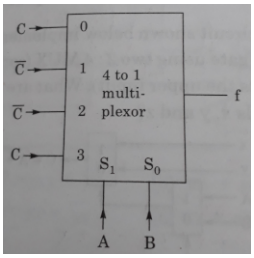
Assignment - 2

1. Design a combinational circuit with four input lines that represent a decimal digit in BCD and four output lines that generates the 9's complement of the input digit.

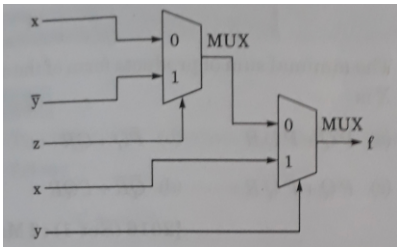
2. Implement the following Boolean functions using three half-adder circuits.
$D = A \oplus B \oplus C$
$E = \overline{A}BC + A\overline{B}C$
$F = AB\overline{C} + (\overline{A} + \overline{B})C$
$G = ABC$

3. Implement the function $f(A, B, C, D) = \sum(0, 1, 5, 7, 10, 14, 15)$ using an appropriate multiplexer.

4. Which Boolean function is implemented by the following Multiplexer.



5. Which function is realize by the circuit given below.

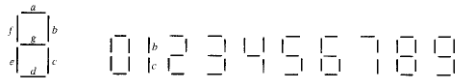


6. A combinational circuit is defined by the following three function:
$F1 = \overline{x}\ \overline{y} + xy\overline{z}$
$F2 = \overline{x} + y$
$F3 = xy + \overline{x}\ \overline{y}$
Design the circuit with decoder and external gates.

7. Construct a 5-to-32 decoder with four 3-to-8 decoder/demultiplexers and a 2-to-4 decoder. Use a block diagram construction.

8. A BCD-to-seven-segment decoder is a combinational circuit that accepts a decimal digit in BCD and generates the appropriate outputs for selection of

segments in a display indicator used for the displaying digit. The seven outputs of the decoder (a, b, c, d, e, f, g) select the corresponding segments in the display as shown in figure below. Design the BCD-to-seven-segment decoder circuit.



[7 + 5 + 5 + 3 + 5 + 5 + 5 + 10]