

Lab 3 (11-10-2021)

Design, Implement and simulate the following circuits in Logisim

1. Design a circuit to convert 4 bit Binary to Gray and 4 bit Gray to Binary Code using XOR gates
2. Design an Excess-3 to BCD code converter and implement using 8:1 multiplexer. *Use the multiplexer available in Plexers library in logisim.*
3. Design a circuit to implement the following functions using (a) 4 to 16 decoder (b) 4 to 1 Multiplexer. *Use the Multiplexer and decoder available in Plexers library in logisim.*

$$F_1(A,B,C,D) = \sum m(11,12,13,14,15)$$

$$F_2(A,B,C,D) = \sum m(3,7,11,12,13,15)$$

$$F_3(A,B,C,D) = \sum m(3,7,12,13,14,15)$$

4. Design a circuit to implement the following function using 16 to 1 Multiplexer. . *Use the Multiplexer available in Plexers library in logisim.*

$$F = A'B'C'D'(R'+S) + AB'C'D' + A'B'C'D + ABC'DQR + AB'C'D + A'B'CD (Q'+T) + ABCDS'T + AB'CD + A'BCD$$

5. Implement (a) 4 bit controllable adder/subtractor (b) 8 bit controllable adder/subtractor. *Use the Adder available in Arithmetic library in logisim.*

Need to upload lab report in the following format in moodle at the end of the lab session as a PDF file

Question

Design – Truth table, Karnaugh maps and any explanation required

Circuit diagram from logisim

Results obtained – Test input and outputs