

School of Information Technology and Engineering

Laboratory work 10 week11
Multiplexer

Done by: **Sagingaly Meldeshuly**
Checked by: **Syed Shah**

Almaty 2024

-1-

Aims: investigate operation of the 8*1 multiplexer.

PREPARATION TO LAB WORK.

- Learn the information about multiplexer.
- Consider the scheme of experiment 10A and define the results theoretically. Draw the scheme using Scheme Design System (SDS).
- Construct and draw (using SDS) 16*1 multiplexer with 2 8*1 multiplexers and an OR gate. This will be the scheme for experiment 10B.
- Answer the questions below in written form.
 1. What is a MUX?
 2. A MUX's another name is
 3. Enable input of a MUX is called
 4. How many functions can a MUX realize?
 5. A MUX can be used as a DUX. True or false? Why?
 6. What is a role of a MUX's selection' lines?

LAB WORK PERFORMANCE.

- Demonstrate presence of your home preparation for lab work to your instructor.
- Pass test of 10 questions.
- Get a permission to begin the work.
- Mount the scheme of experiment 10A on the breadboard and perform it. Fill in the table.
- Make a conclusion about functionality of the scheme. Compare your results with theoretical ones.
- Demonstrate your results to your instructor. If your results are correct you may dismount your scheme, if not, find the mistake.
- Repeat steps 4-6 for experiment 10B.
- Be ready to answer your instructor's questions in process of work.
- Complete your work, dismount your schemes, clean your working place.
- Answer your instructor's final questions, obtain your mark.
- Ask your instructor's permission to leave.

Answers of questions

- 4.1. What is a MUX? A MUX, short for Multiplexer, is a digital circuit that selects one of several input signals and forwards it to a single output.

- 4.2. A MUX's another name is

Another name for a MUX is a data selector.

- 4.3. Enable input of a MUX is called

The enable input of a MUX is called the select or control input.

- 4.4. How many functions can a MUX realize?

A MUX can realize multiple functions depending on the number of select lines it has. Specifically, a 2^n -to-1 MUX with n select lines can realize 2^n different functions.

False. A MUX (Multiplexer) cannot be directly used as a DUX (Demultiplexer) because their functions are different. A MUX selects one of several inputs and forwards it to a single output, while a DUX takes a single input and forwards it to one of several outputs.

- 4.6. What is a role of a MUX's selection' lines?

The selection lines of a MUX determine which input is routed to the output. They control which input is selected based on their binary combination, effectively choosing the desired input signal to be passed through to the output.

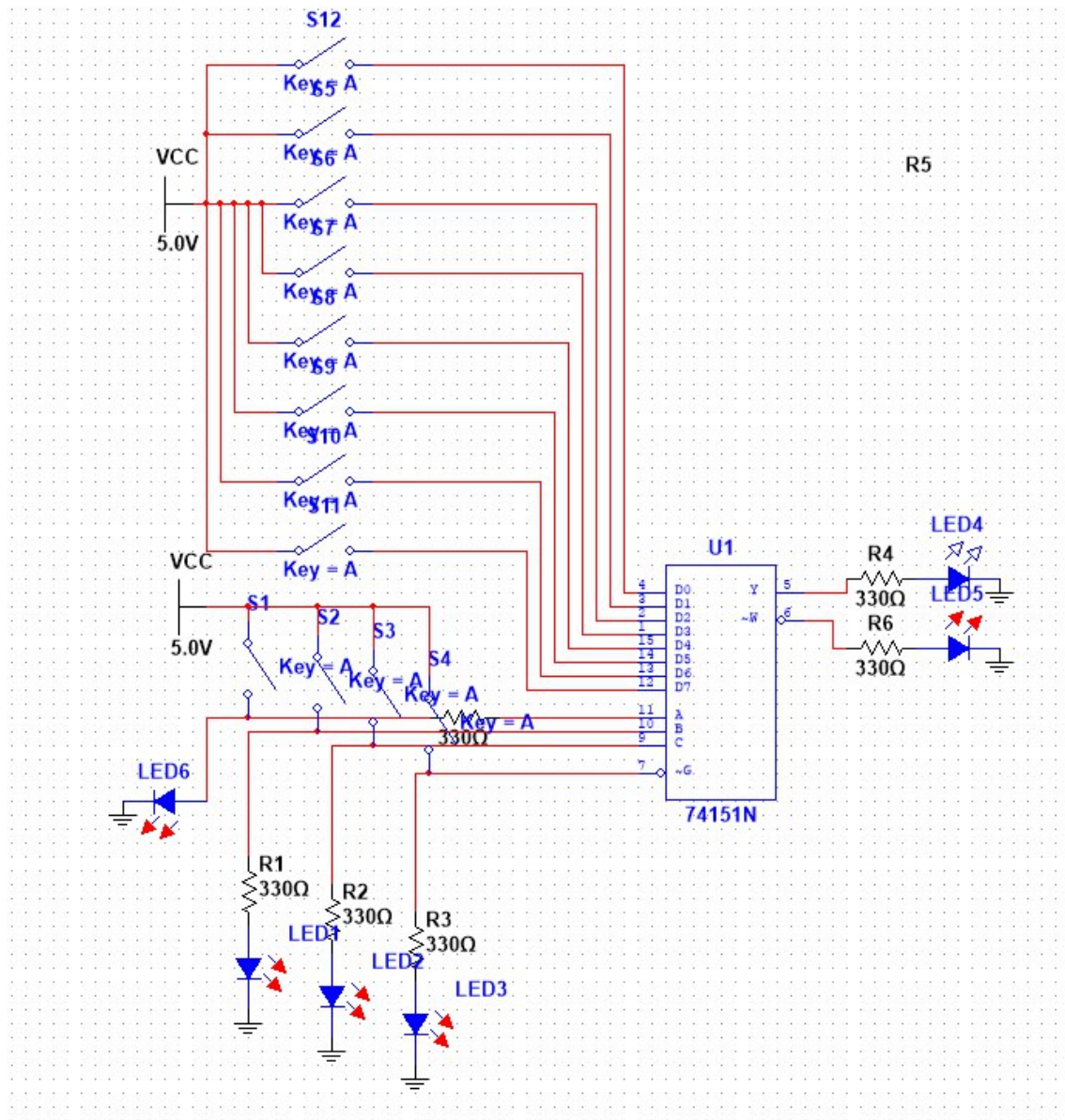
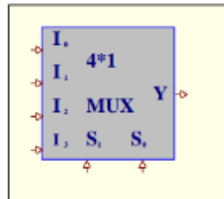


Figure 1: Quiz 1

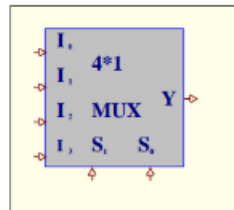
TEST QUESTIONS

1. A multiplexer is a combinational circuit that
 - A. converts binary information from n input lines to a maximum of 2^n unique output lines
 - B. has 2^n (or less) unique input lines and n output lines
 - C. selects binary information from one of many input lines and direct it to a single output line
 - D. receives information on a single line and transmits this information on one of 2^n possible output lines
 - E. converts binary information from n input lines to m output lines
2. Strobe is
 - A. enable input of decoder
 - B. disable input of decoder
 - C. enable input of multiplexer
 - D. disable input of demultiplexer
 - E. disable input of multiplexer
3. What will the output signal of 4*1 multiplexer be if selection lines $S_1S_0=11$?



- A. I_0
- B. I_1
- C. I_2
- D. I_3
- E. any of them

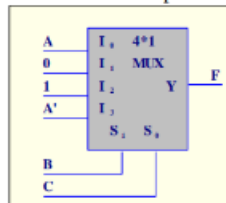
4. What are selection lines of 4*1 multiplexer if output signal $Y=I_1$?



- A. 00
- B. 01
- C. 10
- D. 11
- E. any of them

Figure 2: Quiz 1

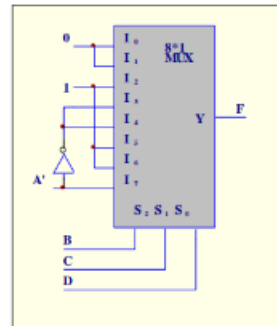
5. What function is implemented with multiplexer?



- A. $F(A,B,C) = \Sigma(2,3,5,6)$
- B. $F(A,B,C) = \Sigma(1,3,5,6)$
- C. $F(A,B,C) = \Sigma(2,3,5,7)$
- D. $F(A,B,C) = \Sigma(2,3,4,6)$
- E. $F(A,B,C) = \Sigma(1,3,5,7)$

6. What function is implemented with multiplexer?

- A. $F(A,B,C,D) = \Sigma(2,5,6,7,10,11,12,13,14)$
- B. $F(A,B,C,D) = \Sigma(0,1,3,4,7,14)$
- C. $F(A,B,C,D) = \Sigma(0,1,3,4,8,15)$
- D. $F(A,B,C,D) = \Sigma(0,1,3,4,8,9,15)$
- E. $F(A,B,C,D) = \Sigma(0,1,3,5,7,14,15)$



40

7. Decoder is _____ component.

- A. SSI B. MSI C. LSI D. VLSI E. SSI or MSI

8. For the circuit below if selection lines $S_2S_1S_0=011$ the output Z will be ____, if $S_2S_1S_0=100$, Z will be ____, if $S_2S_1S_0=001$, Z will be ____.

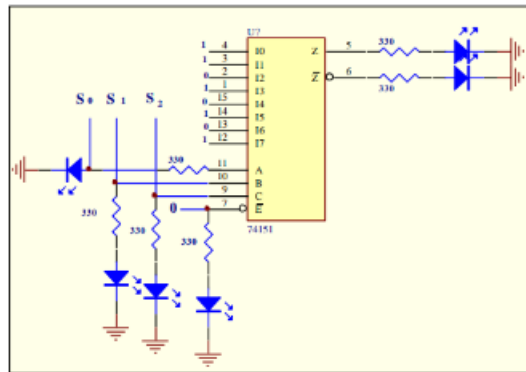
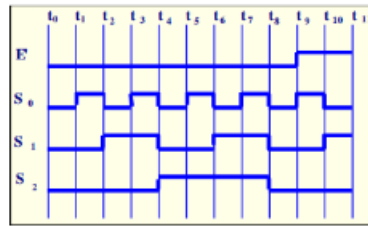


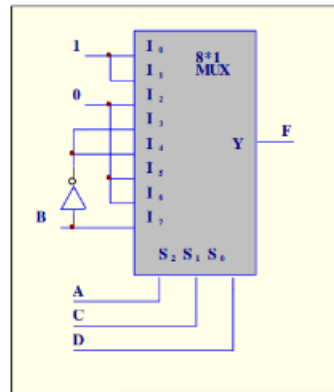
Figure 3: Quiz 2

9. For the circuit in question 8 the output Z is equal to _____ for periods of time between t_3 and t_4 , t_4 and t_5 , t_5 and t_6 .



- A. 0,1,1 B. 0,1,0 C. 1,1,1 D. 0,0,1 E. 1,0,1

10. What function is implemented with multiplexer?



- A. $F(A,B,C,D) = \Sigma(0,1,3,4,5,8,15)$
 B. $F(A,B,C,D) = \Sigma(0,1,3,4,7,14)$
 C. $F(A,B,C,D) = \Sigma(0,1,3,4,8,15)$
 D. $F(A,B,C,D) = \Sigma(0,1,3,4,8,9,15)$
 E. $F(A,B,C,D) = \Sigma(0,1,3,5,7,14,15)$

Figure 4: Quiz 3

- C. selects binary information from one of many input lines and direct it to a single output line.
- A. enable input of decoder.
- D. I11
- B. 01
- A.
- D.
- B. MSI
- E. 1,0,1
- A. 1,0,1
- C