Digital Logic Design

(EL-1005)

LABORATORY MANUAL

SPRING 2024

LAB 12

Multiplexer

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STUDENT NAME ROLL NO SEC

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FACULTY'S SIGNATURE & DATE

MARKS AWARDED: /02

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Lab Session 12: Multiplexer

OBJECTIVES:

- Understand the basic concept of Multiplexing
- Perform the 1-of-8-line multiplexing by using 74LS151 eight input multiplexer IC
- Familiarize with inputs, outputs, data select and enable pins of 74LS151
- Discuss practical applications of Multiplexer

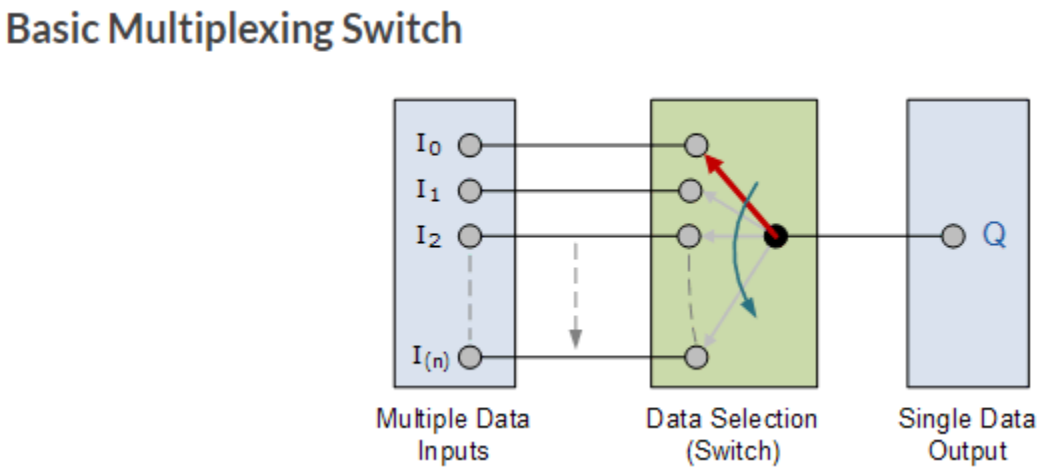
APPARATUS: Logic trainer, Logic probe

COMPONENTS: ICs 74LS151

THEORY:

Multiplexing is the generic term used to describe the operation of sending one or more analogue or digital signals over a common transmission line at different times or speeds and as such, the device we use to do just that is called a **Multiplexer**.

The *multiplexer*, shortened to "MUX" or "MPX", is a combinational logic circuit designed to switch one of several input lines through to a single common output line by the application of a control signal. Multiplexers operate like very fast acting multiple position rotary switches connecting or controlling multiple input lines called "channels" one at a time to the output.



A **74LS151** has eight inputs that can be individually selected by three select lines. The output is connected to the input line selected by the binary value on the three select lines. If the three select lines are all zeros, then input line "0" is selected and connected to the output line.

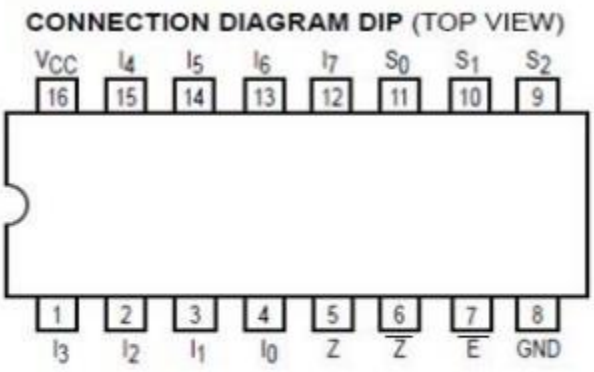


Fig 1. Pin Configuration

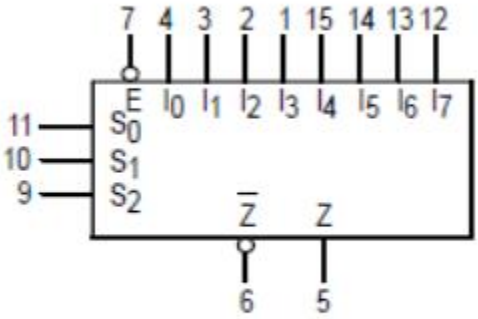


Fig 2. Logic Symbol

PIN Description:

S0–S2	**Select Inputs**
E'	**Enable (Active LOW)**
Input I0–I7	**Multiplexer Inputs**
Z	**Multiplexer Output**
Z'	**Complementary Multiplexer Output**

Applications of Multiplexer:

Multiplexer are used in various fields where multiple data need to be transmitted using a single line. Following are some of the applications of multiplexers –

1. **Communication system –**

Communication system is a set of system that enable communication like transmission system, relay and tributary station, and communication network. The efficiency of communication system can be increased considerably using multiplexer. Multiplexer allow the process of transmitting different type of data such as audio, video at the same time using a single transmission line.

2. **Telephone network –**

In telephone network, multiple audio signals are integrated on a single line for transmission with the help of multiplexers. In this way, multiple audio signals can be isolated and eventually, the desire audio signals reach the intended recipients.

3. **Computer memory –**

Multiplexers are used to implement huge amount of memory into the computer, at the same time reduces the number of copper lines required to connect the memory to other parts of the computer circuit.

LAB TASKS

Name _____ Student ID _____ Section _____

Exercise # 1

Implement 8x1 Multiplexer using Logic Gates on Logic Works and also make the Truth Table.

Exercise # 2

Implement 16x1 multiplexer on Logic Works. Submit the file on Google Classroom.