Objectives
• Understand the concept of multiplexing in the context of digital logic circuits.
• Learn about the internal logic of digital multiplexers.
• Implement digital logic functions using multiplexers.
• Observe and analyze the operations of the 3 to 8 Line Decoder

Theory
Multiplexers: A multiplexer is a combinational circuit that selects binary information from one of many input lines and directs it to a single output line. The selection of a particular input line is controlled by a set of selection lines. Normally, there are 2^n input lines and n selection lines whose bit combinations determine which input is selected.
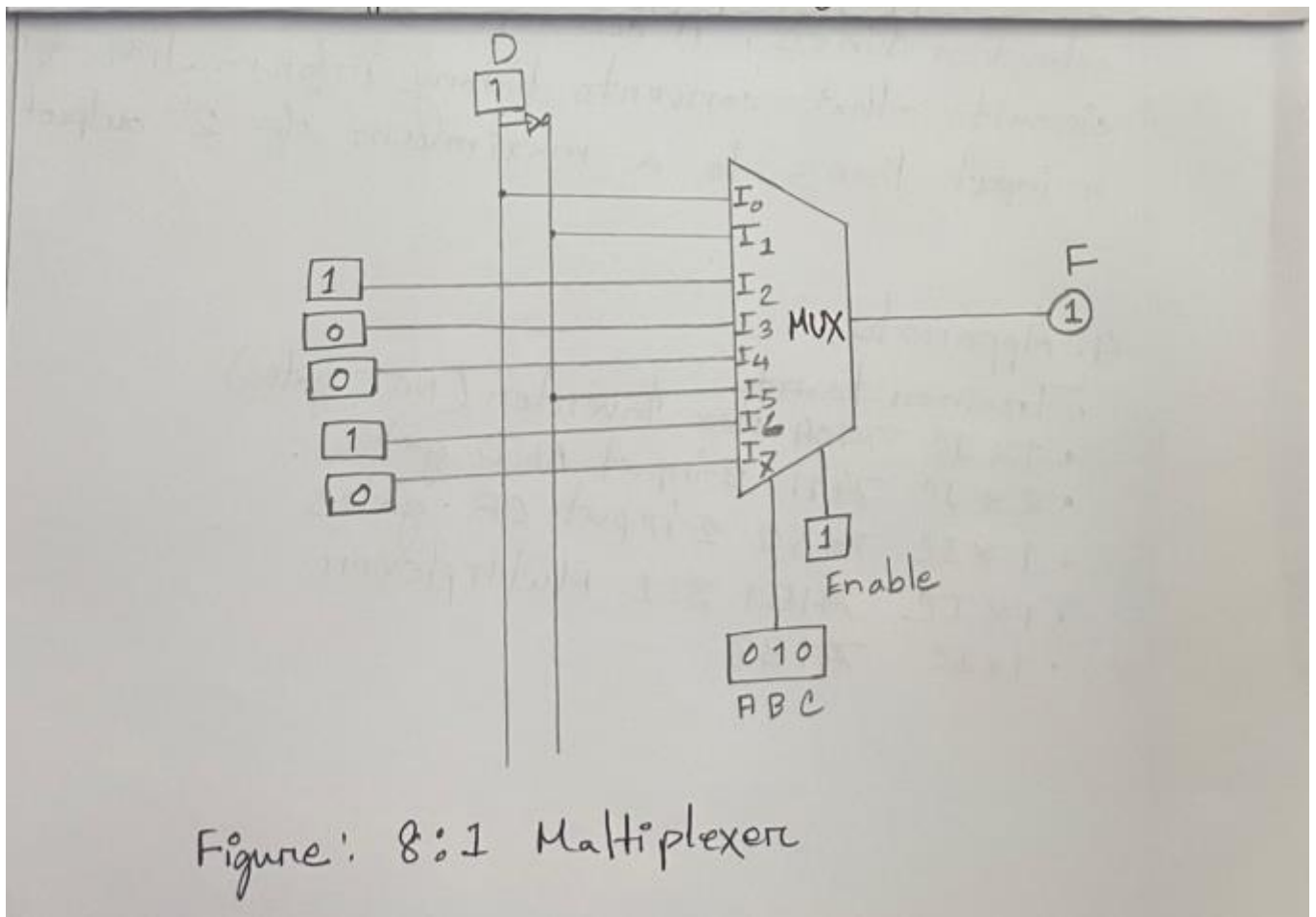**Decoders:** A decoder is a combinational circuit that converts binary information from n input lines to a maximum of 2^n output lines.
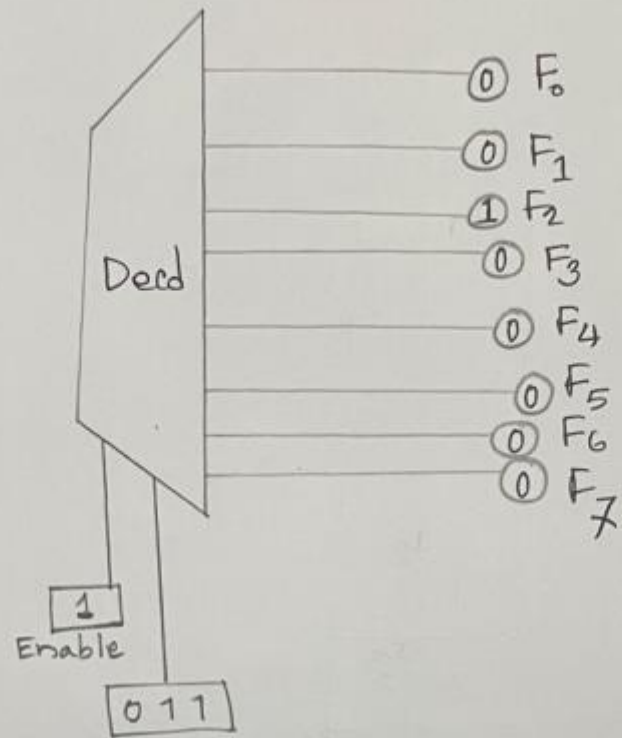
Apparatus
• Trainer board
• 1 x IC 74151 8:1 Multiplexer
• 1 x IC 74138
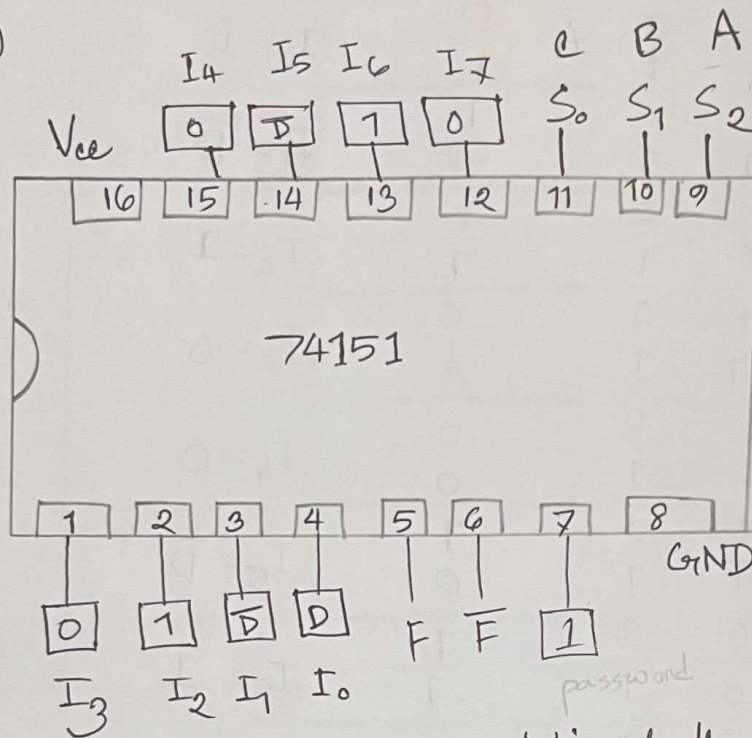
(চিত্র আঁকার সময় অবশ্যই পেন্সিল ব্যবহার করতে হবে)

Diagram

Figure: 8:1 Multiplexer

Questions and Answers (Q/A):

①

74151

IC diagram for the implementation of the function F.

$$F(A,B,C,D) = \sum(1,2,4,5,10,12,13)$$

②

The difference between an active-high and an active-low device :-

An active high device is a device that either outputs a high signal (LED turned on) when triggered on on that accepts a high signal as input to turn on. On the other hand, an active low device is a device that either outputs 0V (LED turned off) when triggered on on that accepts 0V as input to turn on. It depends on whether the device is an input or an output device.

Discussion

Learned how to implemente any boolean function both ways, using basic logic gates and using maltiplexer. Also learned the internal logic of digital multi-plexers and the implementation of digital logic functions using multiplexers. The functionalities of decoder is clear and also observed and analyzed the operations of the 3 to 8 Line Decoder.