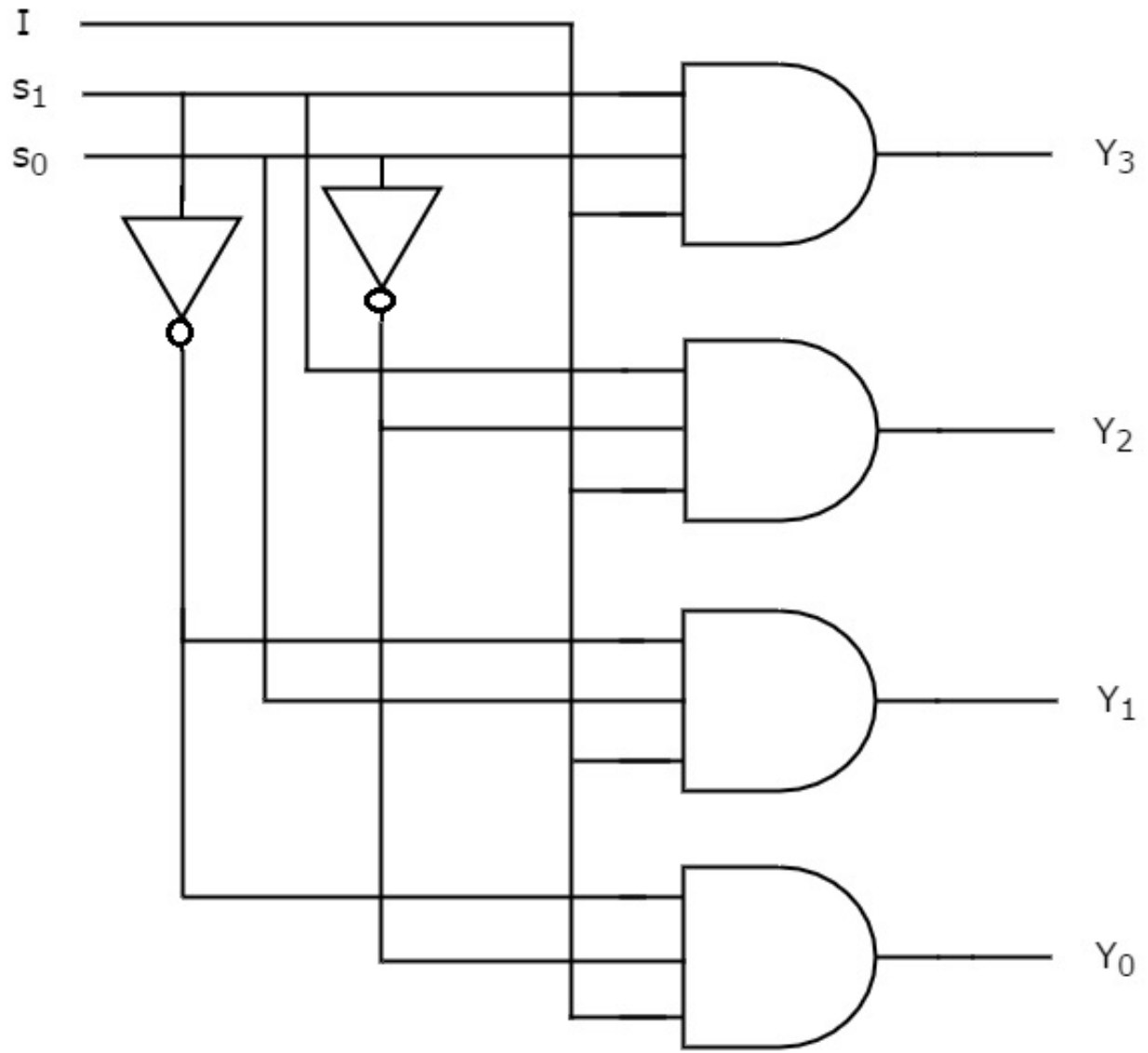
Combinational Circuits

Demultiplexer

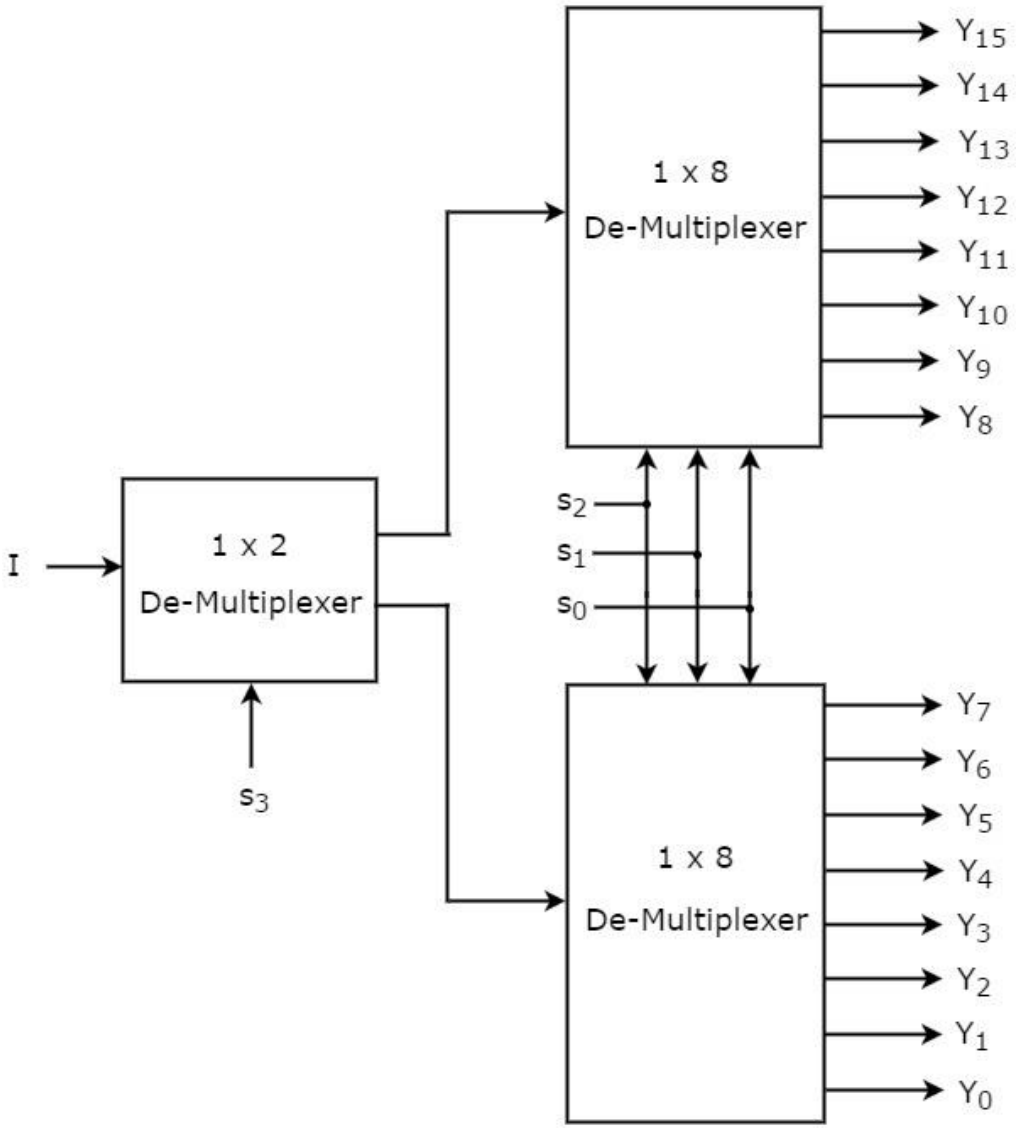
- A decoder with enable input can function as demultiplexer.
- It is a circuit that receives information in a single line and transmits this information on one of 2^n possible output lines.
- Because decoder and demultiplexer operations are obtained from the same circuit, a decoder with an enable input is referred as decoder/demultiplexer.

Demultiplexer



Demultiplexer Using Demultiplexers

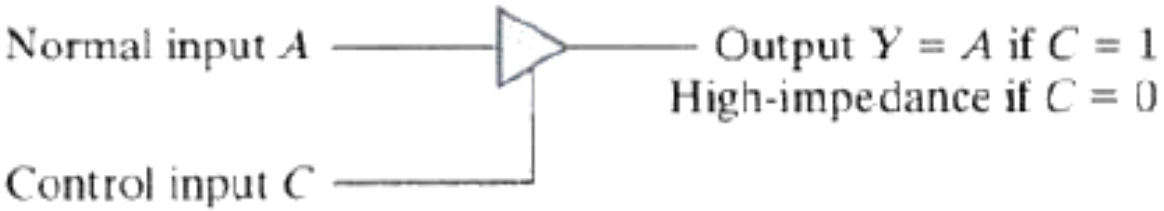
- Demultiplexers can be connected together to form a larger demultiplexer circuit.



Three-State Gates

- **Digital circuits that exhibit three states.**
  - **Logic 0**
  - **Logic 1**
  - **Hight-impedence**
    - **The logic behaves an open circuit(disconnected)**
    - **The circuit has no logic significance**
    - The circuit connected to the output of the three-state gate is not affected by the inputs to the gate.
  - Can perform AND or NAND.But generally used as buffer gate.

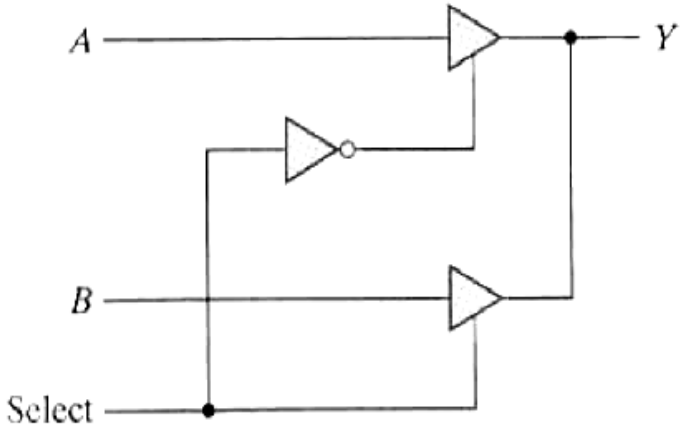
Three-State Gates



- Control input is 1 – output enabled and behaves like a conventional buffer.
- Control input is 0 – output is disabled and the gate goes to high-impedance state regardless of the value in normal input.
- High impedance state
  - Special feature not available in other gates.
  - A large number of three-state gate outputs can be connected with wires to form a common line without endangering loading effects.

Multiplexer using three-state gates

- A multiplexer can be connected using three-state gate.



2 x 1 Mux

4 x 1 Mux