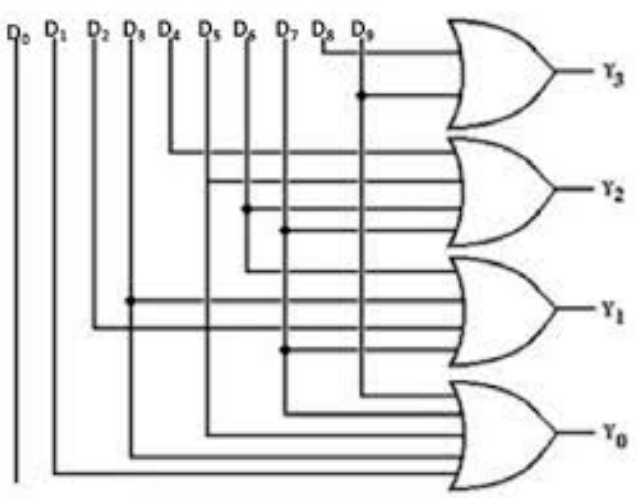
1. Design and explain:
    a. BCD to Decimal encoder

    An encoder is a logic circuit used to convert decimal input to binary. Depending on which numbered switch is on, an output will be produced that represents the binary equivalent of the switch number.

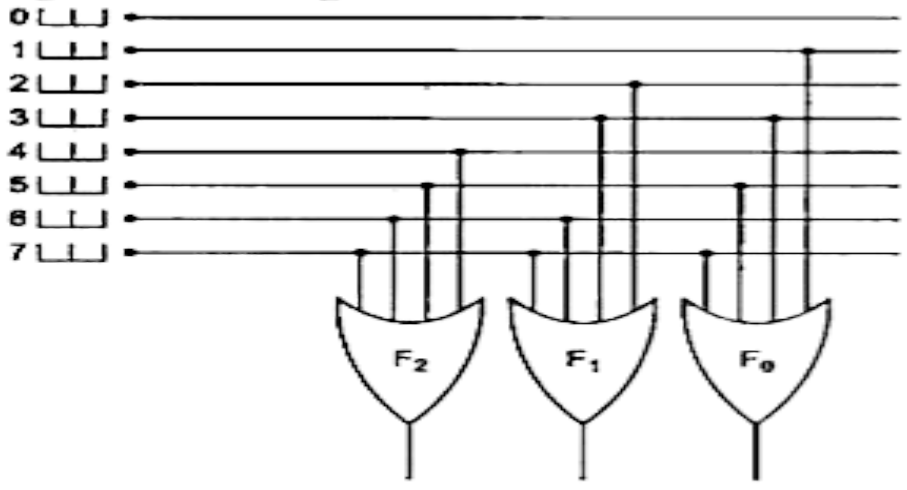


    b. Octal to binary encoder using OR gates

    The octal-to-binary encoder takes input from the octal and converts it to the corresponding binary number. It takes input in the form of 8 switches and, based on the switch number, produces output.

F_2	F_1	F_0	Octal Numbers
0	0	0	0
0	0	1	1
0	1	0	2
0	1	1	3
1	0	0	4
1	0	1	5
1	1	0	6
1	1	1	7

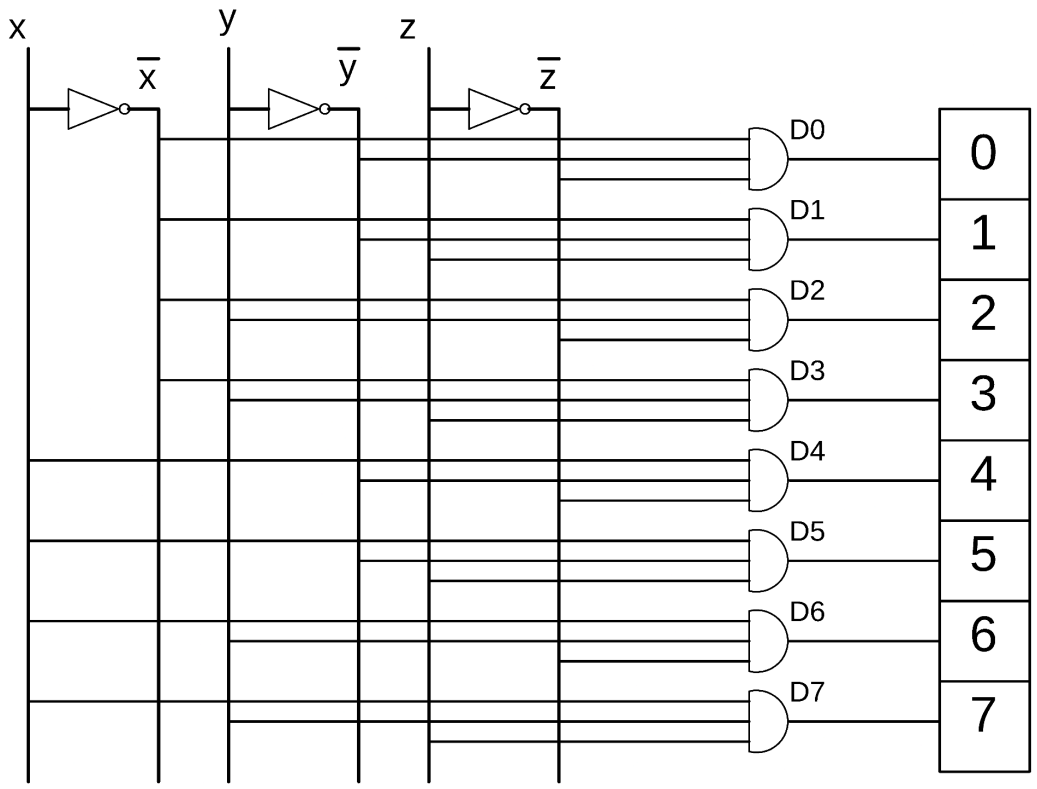
Logic Circuit Diagram :



Octanary Encoder

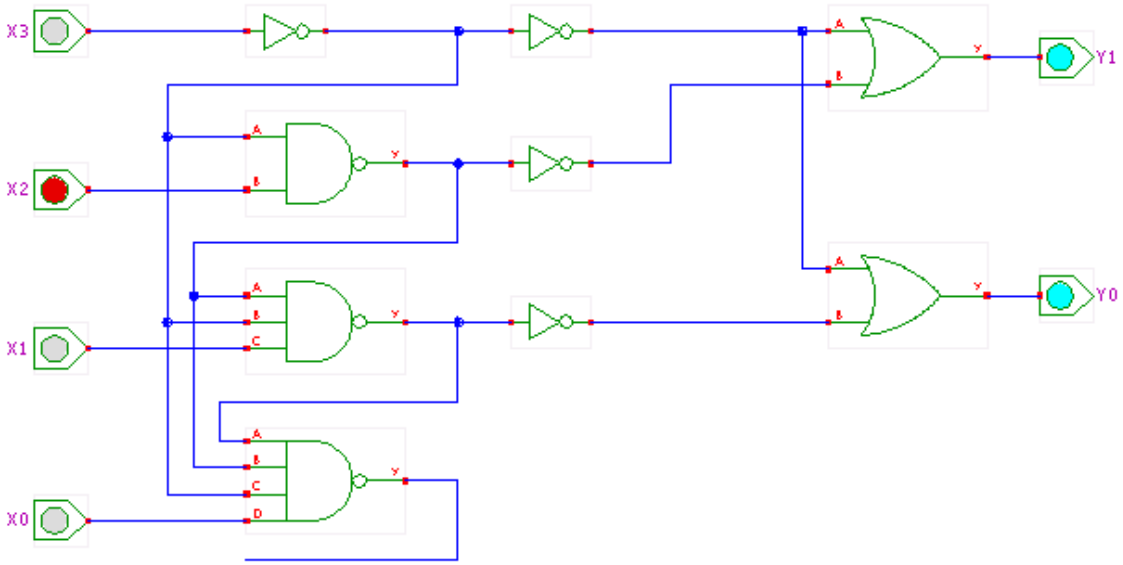
c. 3:8 Decoder

The decoder is the opposite of the encoder a 3:8 decoder acts as the opposite of an 8:3 encoder or Octalto binary encoder. It takes Binary input and converts it to the corresponding Octal value



d. 4:2 Priority encoder

4:2 encoder converts the input from 4 lines to 2 lines. The advantage of the priority encoder is that we can assign priority to the input bits. This way when 2 bits are on at the same time only the higher-priority one is considered



2. Explain the difference between

a. Encoder and Decoder

Encoder

- Converts more lines into a less.
- They are used to convert higher base numbers to lower base numbers.
- Operation is simple

Decoder

- Converts lesser lines into more.
- They are used to convert lower base numbers into higher base numbers.
- Operation is complex.

b. Encoder and Priority encoder

The major difference between an encoder and a priority encoder is that we can assign priority to the input bits. Due to this when 2 bits are on at the same time the lower priority is ignored but to build this the circuit is more complex and harder to design. An encoder includes several input lines however only one of them is turned on at a specified time whereas a priority encoder includes above one input turned on at the same time

3. Applications of

a. Priority encoder

- Used to handle interrupts in a processor.
- They can be used to convert any data into a code format.
- It can also be used to access memory in simpler memory configurations.

4. Basic functions of

a. Digital encoder

An encoder is a logic circuit used to convert digital data to binary. Depending on which numbered switch is on, an output will be produced that represents the binary equivalent of the switch number. They are used to convert higher base numbers to lower base numbers.

b. Digital decoder

The decoder is the opposite of the encoder. It takes Binary input and converts it to the corresponding higher base value. They are used to convert lower base numbers into higher base numbers.