ENCODERS

An encoder is a digital circuit that performs the inverse operation of a decoder. An encoder has 2^n (or fewer) input lines and n output lines. The output lines generate the binary code corresponding to the input values. An example of an encoder is the octal-to-binary encoder whose truth table is given in Table. IT has eight inputs (one for each of the octal digits)a and three outputs that generate the corresponding binary number. IT is assumed that only one input has a value of 1 at any given time.

The encoder can be implemented with OR gates whose inputs are determined directly from the truth table. Output z is equal to 1 when the input octal digit is 1, 3, 5, or 7. Output y is for octal digits 2, 3, 6, or 7 and output x is 1 for digits 4, 5, 6 or 7. These conditions can be expressed by the following output Boolean functions:

$$Z = D_1 + D_3 + D_5 + D_7$$

$$Y = D_2 + D_3 + D_6 + D_7$$

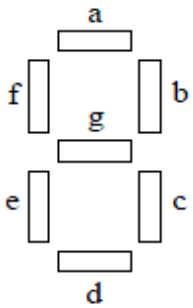
$$X = D_4 + D_5 + D_6 + D_7$$

The encoder can be implemented with three OR gates.

The encoder defined in Table has the limitation that only one input can be active at any given time. If two inputs are active simultaneously, the output produces and undefined combination. For example, if D_3 and D_6 are 1 simultaneously, the output of the encoder will be 111 because all three outputs are equal to 1. This does not represent either binary 3 or binary 6. To resolve this ambiguity, encoder circuits must establish an input priority to ensure that only one input is encoded. IF we establish a higher priority for inputs with higher subscript numbers, and if both D_3 and D_6 are 1 at the same time, the output will be 110 because D6 has higher priority than D_3.

BCE to 7 segment decoder

The BCD input of this decoder provides an output that energizes the seven segment display devices. The seven segment display consists of seven light emitting segments. The segments are designated by letters a to g.



The logic circuit and function table of BCD to seven segment decoder is shown below.

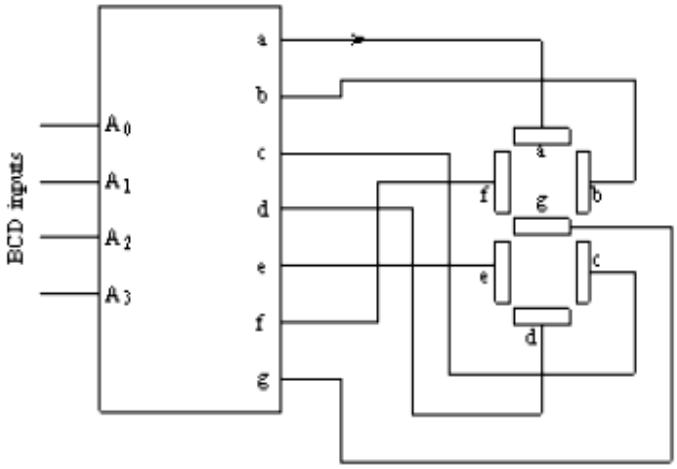


Fig: Logic circuit

Two types of segment displays are available; they are common anode type (or) common cathode type.

Decimal Digit	BCD				Seven Segment Code						
	A_3	A_2	A_1	A_0	a	b	c	d	e	f	g
0	0	0	0	0	1	1	1	1	1	1	0
1	0	0	0	1	0	1	1	0	0	0	0
2	0	0	1	0	1	1	0	1	1	0	1
3	0	0	1	1	1	1	1	1	0	0	1
4	0	1	0	0	0	1	1	0	0	1	1
5	0	1	0	1	1	0	1	1	0	1	1
6	0	1	1	0	1	0	1	1	1	1	1
7	0	1	1	1	1	1	1	0	0	0	0
8	1	0	0	0	1	1	1	1	1	1	1
9	1	0	0	1	1	1	1	1	0	1	1

Fig: Functional Table of BCD to seven segment decoder using common cathode display