



Lab Report - 07

Course No: 206

Course Title: Digital Logic Design

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Lab-07

Name of Experiment : To check the operation of Active Low decoder, Binary code Decimal encoders, Designing of octal to Binary encoders and Hexadecimal to BCD encoders.

Equipment :

1. 2 input OR gate
2. 5 input OR gate
3. 8 input OR gate
4. Logic probe
5. Logic state
6. Not gate
7. 3 input AND gate.

Description : An encoder is a combinational circuit that performs the reverse operation of decoder. It has maximum of 2^n input lines and 'n' output lines.

It will produce a binary code equivalent to the input which is active High. Therefore the

the encoder encodes 2^n input lines with n bits. it is optional to represent the enable signal in encoders.

Demux

Demultiplex (Demux) is the reverse of the multiplex process — combining multiple unrelated analog or digital signal streams into one signal over a single shared medium, such as a single conductor of copper wire or fiber optic cable.

The demux is also known as 2-to-4 Demultiplexer which means that it has two select line and 4 output line.

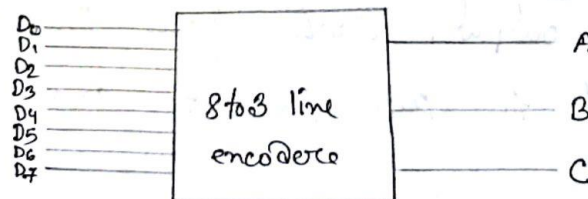
truth table of Demux

E	A	B	D ₀	D ₁	D ₂	D ₃
0	0	0	0	1	1	1
0	0	1	1	0	1	1
0	1	0	1	1	0	1
0	1	1	1	1	1	0

Function :- $D_0 = \overline{E} + x + y$ $D_1 = \overline{E'x'y}$ $D_2 = \overline{E'x'y'}$
 $= E'x'y'$ $D_3 = \overline{E'xy}$

8 to 3 line Encoder

The 8 to 3 line encoder or octal to Binary encoder consist of 8 inputs : E₀ to E₇ and 3 outputs A B C. Each input line corresponds to each octal digit and three outputs generate corresponding binary code.



8 to 3 line encoder truth table

E_0	E_1	E_2	E_3	E_4	E_5	E_6	E_7	A	B	C
1								0	0	0
	1							0	0	1
		1						0	1	0
			1					0	1	1
				1				1	0	0
					1			1	0	1
						1		1	1	0
							1	1	1	1

function of 8 to 3 line Encoder

$$A = \overline{E_1} + \overline{E_3} + E_5 + E_7$$

$$B = E_2 + E_3 + E_6 + E_7$$

$$C = E_4 + E_5 + E_6 + E_7$$

Decimal to BCD Encoders

The 10 to 4 line encoders consist of 10 input this is the decimal numbers and 4 output this is the Binary coded Decimal numbers system. it contains 4 output. Each input line corresponds to each Decimal to BCD generate corresponding binary code.

Truth table of Decimal to BCD encoders

E_0	E_1	E_2	E_3	E_4	E_5	E_6	E_7	E_8	E_9	A	B	C	D
1										0	0	0	0
	1									0	0	0	1
		1								0	0	1	0
			1							0	0	1	1
				1						0	1	0	0
					1					0	1	0	1
						1				0	1	1	0
							1			0	1	1	1
								1		1	0	0	0
									1	1	0	0	1

Function of Decimal to BCD Encoders

$$A = E_8 + E_9$$

$$B = E_4 + E_5 + E_6 + E_7$$

$$C = E_2 + E_3 + E_6 + E_7$$

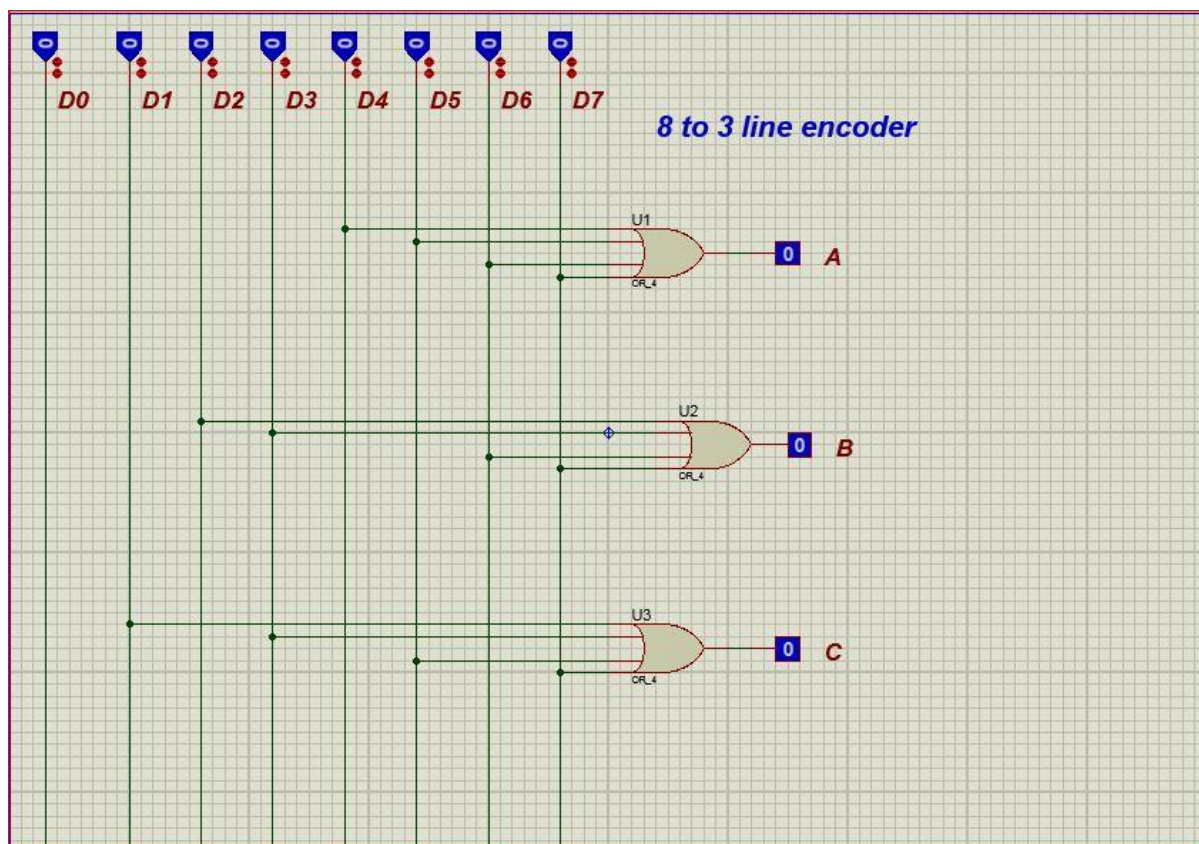
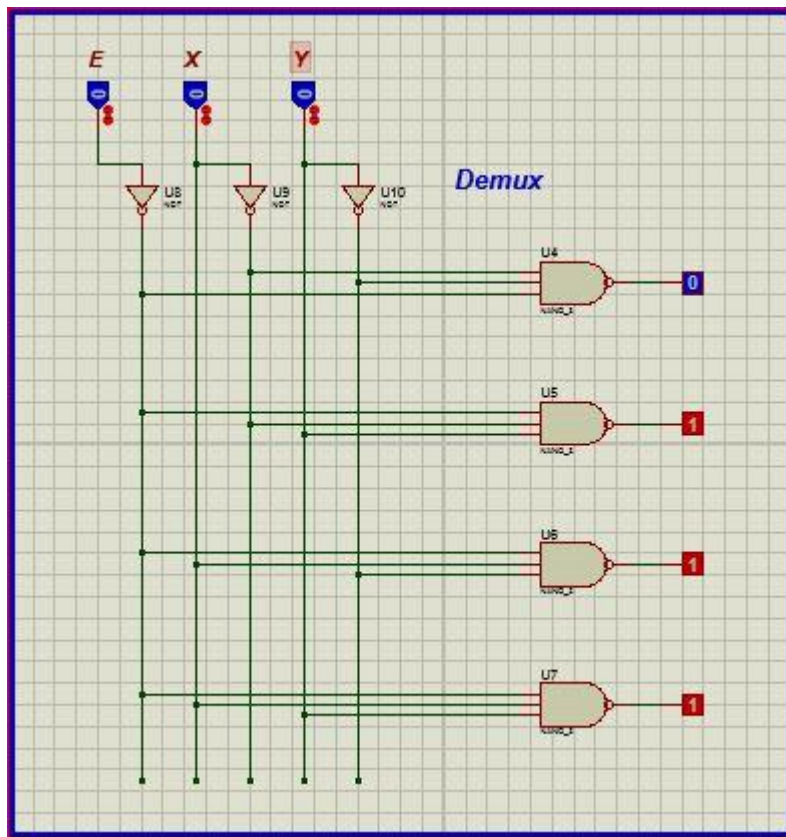
$$D = E_1 + E_3 + E_5 + E_7 + E_9$$

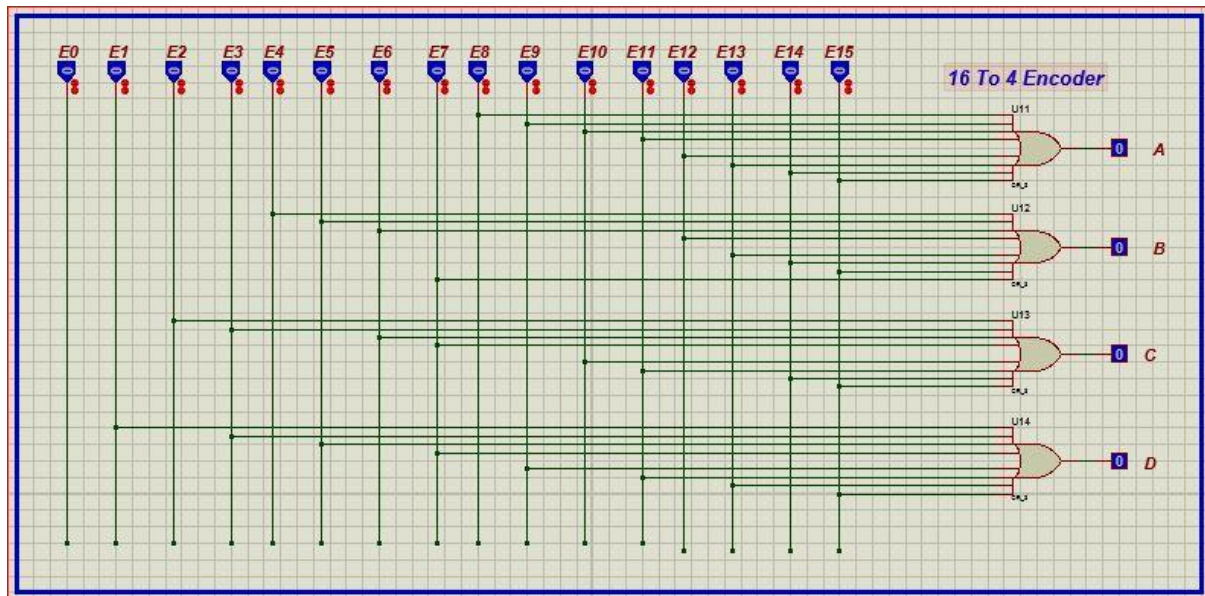
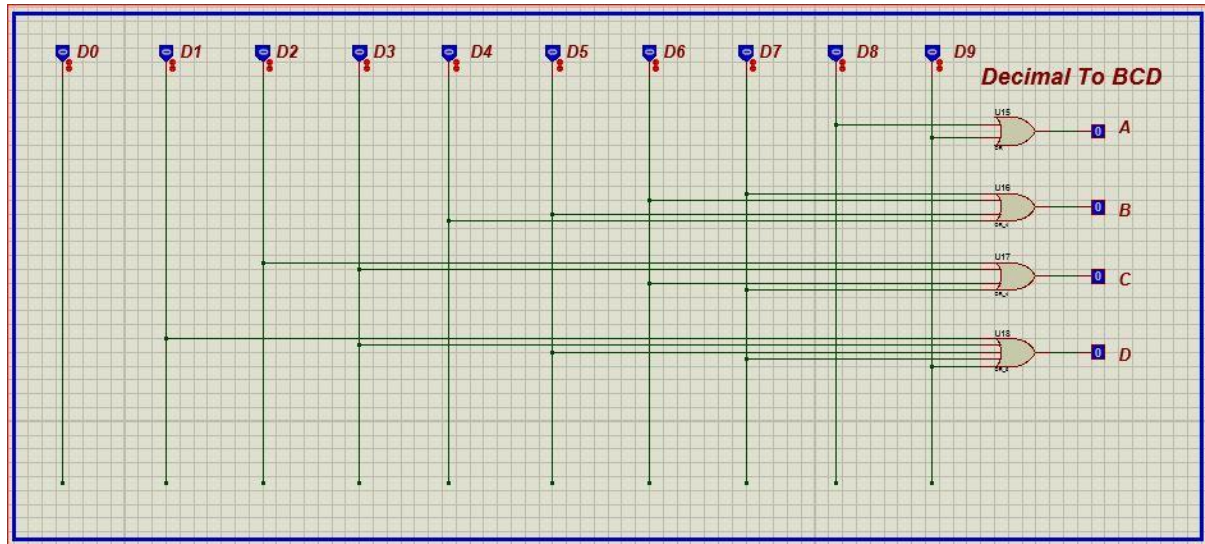
16 to 4 line Encoder

The Hexadecimal to Binary encoder usually consists of 16 line to 4 output lines. Each input line corresponds to the each decimal digit and 4 outputs corresponds to the BCD code. This encoder accepts the decoded decimal data as an inputs and encodes it to the BCD output which is available on the output lines.

Truth table of 16 to 4 line encoder

E ₀	E ₁	E ₂	E ₃	E ₄	E ₅	E ₆	E ₇	E ₈	E ₉	E ₁₀	E ₁₁	E ₁₂	E ₁₃	E ₁₄	E ₁₅	A	B	C	D	
1																	0	0	0	0
	1																0	0	0	1
		1															0	0	1	0
			1														0	0	1	1
				1													0	1	0	0
					1												0	1	0	1
						1											0	1	1	0
							1										0	1	1	1
								1									1	0	0	0
									1								1	0	0	1
										1							1	0	1	0
											1						1	0	1	1
												1					1	0	0	0
													1				1	1	0	1
														1			1	1	1	0
															1		1	1	1	1





Conclusion:

- ① We have learnt that how work Demux and Encoders.
- ② We have learnt that the difference between Decoder and Encoder.
- ③ we also learnt that how to Design Decimal to BCD Encoders.
- ④ we also learnt that how to Design Octal to BCD Encoder.
- ⑤ we have learnt that how to Design Hexa to BCD Encoders.
- ⑥ we also learnt how to implement those encoders using basic gates in proteus.