

Kathmandu University
Department of Electrical and Electronics Engineering
DIGITAL ELECTRONICS LABORATORY EXPERIMENTS

LAB 5: DECODERS/DEMULTIPLEXERS

Components Required:

- IC 74138
- Bread board
- Light Emitting Diode (LED)
- Resistors(1 K Ω)

THEORY:

Decoder

- A decoder is a combinational circuit that converts binary information from n input lines to a maximum of 2^n unique output lines.
- A decoder generates 2^n minterms of n input variables

Demultiplexer

- A decoder with an enable input is a demultiplexer
- A demultiplexer is a circuit that receives information on a single line and transmits this information on one of the 2^n possible output lines.

Pin Diagram and Truth table



TRUTH TABLE

INPUTS						OUTPUTS							
E ₁	E ₂	E ₃	A ₀	A ₁	A ₂	O ₀	O ₁	O ₂	O ₃	O ₄	O ₅	O ₆	O ₇
H	X	X	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	L	X	X	X	H	H	H	H	H	H	H	H
L	L	H	L	L	L	L	H	H	H	H	H	H	H
L	L	H	H	L	L	H	L	H	H	H	H	H	H
L	L	H	L	H	L	H	H	L	H	H	H	H	H
L	L	H	H	H	L	H	H	H	L	H	H	H	H
L	L	H	L	L	H	H	H	H	H	L	H	H	H
L	L	H	H	L	H	H	H	H	H	H	L	H	H
L	L	H	L	H	H	H	H	H	H	H	H	L	H
L	L	H	H	H	H	H	H	H	H	H	H	H	L

H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care

Procedure:

1. Connect the IC as per the given diagram on the bread board.
2. Apply +5V as logic 1 input and ground as logic 0 input.
3. Check the outputs of logic gates using Light Emitting Diodes.
4. Obtain the outputs of the logic gates for different input conditions of the decoder.