

EXPT NO. : 5

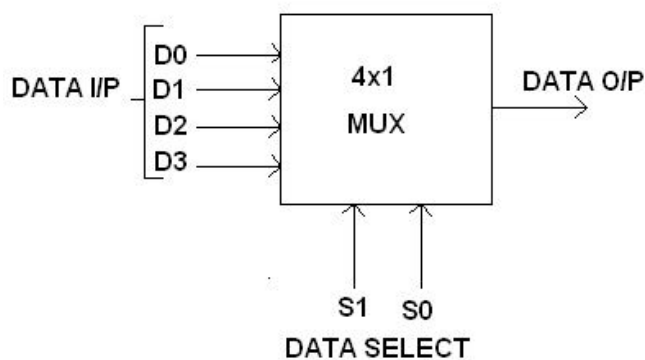
AIM: To design and implement multiplexer and de-multiplexer using logic gates.

APPARATUS REQUIRED:

Sl. No.	COMPONENT	SPECIFICATION	QTY.
1.	OR GATE	IC 7432	1
2.	NOT GATE	IC 7404	1
3.	AND GATE (2 I/P)	IC 7408	1
4.	AND GATE (3 I/P)	IC 7411	2
5.	BREAD BOARD	-	1
6.	PATCH CORDS	-	-
7.	POWER SUPPLY WITH LOGIC PROBE	-	1

MULTIPLEXER: Multiplexer means transmitting a large number of information units over a smaller number of channels or lines. A digital multiplexer is a combinational circuit that selects binary information from one of many input lines and directs it to a single output line. The selection of a particular input line is controlled by a set of selection lines. Normally there are 2^n input line and n selection lines whose bit combination determine which input is selected.

BLOCK DIAGRAM FOR 4:1 MULTIPLEXER:

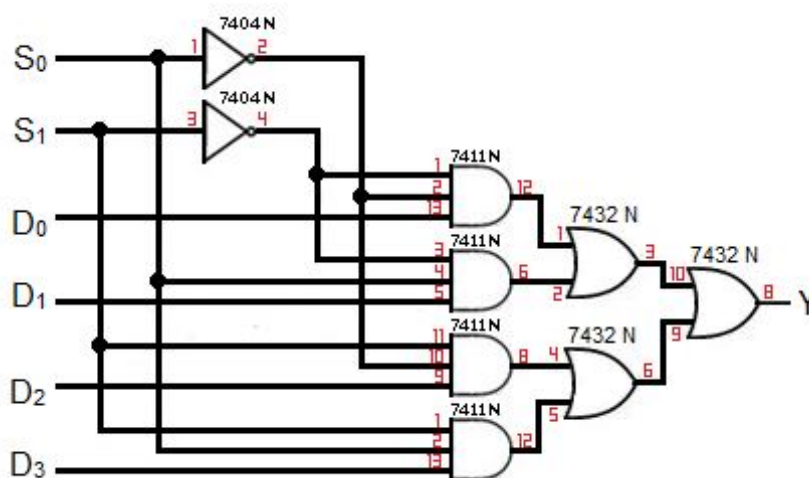


FUNCTION TABLE:

S1	S0	INPUTS Y
0	0	$D_0 \rightarrow D_0 S_1' S_0'$
0	1	$D_1 \rightarrow D_1 S_1' S_0$
1	0	$D_2 \rightarrow D_2 S_1 S_0'$
1	1	$D_3 \rightarrow D_3 S_1 S_0$

$$Y = D_0 S_1' S_0' + D_1 S_1' S_0 + D_2 S_1 S_0' + D_3 S_1 S_0$$

CIRCUIT DIAGRAM FOR MULTIPLEXER:



TRUTH TABLE:

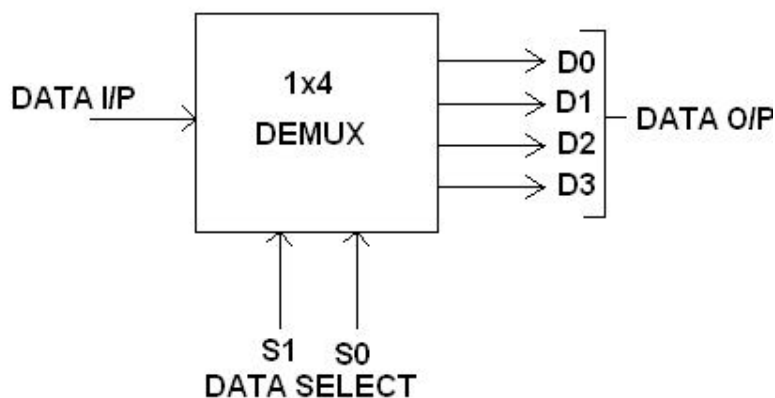
OUTPUT						
S ₀	S ₁	D ₀	D ₁	D ₂	D ₃	Y
0	0	1	0	0	0	1
0	1	0	1	0	0	1
1	0	0	0	1	0	1

1	1	0	0	0	1	1
---	---	---	---	---	---	---

DEMULTIPLEXER: The function of de-multiplexer is in contrast to multiplexer function. It takes information from one line and distributes it to a given number of output lines. For this reason, the de-multiplexer is also known as a data distributor. Decoder can also be used as de-multiplexer.

In the 1: 4 de-multiplexer circuit, the data input line goes to all of the AND gates. The data select lines enable only one gate at a time and the data on the data input line will pass through the selected gate to the associated data output line.

BLOCK DIAGRAM FOR 1:4 DEMULTIPLEXER:

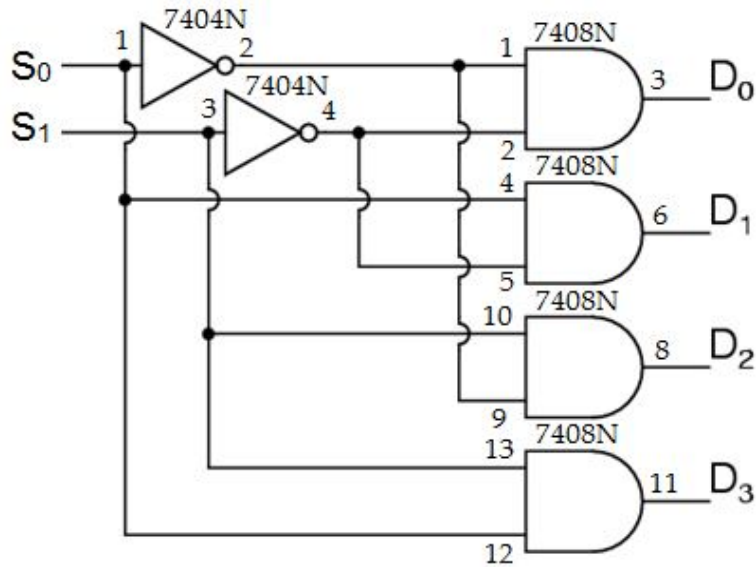


FUNCTION TABLE:

S1	S0	INPUT
0	0	$X \rightarrow D0 = X S1' S0'$
0	1	$X \rightarrow D1 = X S1' S0$
1	0	$X \rightarrow D2 = X S1 S0'$
1	1	$X \rightarrow D3 = X S1 S0$

$$Y = X S1' S0' + X S1' S0 + X S1 S0' + X S1 S0$$

LOGIC DIAGRAM FOR DEMULTIPLEXER:



TRUTH TABLE:

OUTPUT					
S_1	S_0	D_0	D_1	D_2	D_3
0	0	1	0	0	0
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1

PROCEDURE:

- Connections are given as per circuit diagram.
- Logical inputs are given as per circuit diagram.
- Observe the output and verify the truth table.

OBSERVATION TABLE:

S_1	S_0	D_0	D_1	D_2	D_3