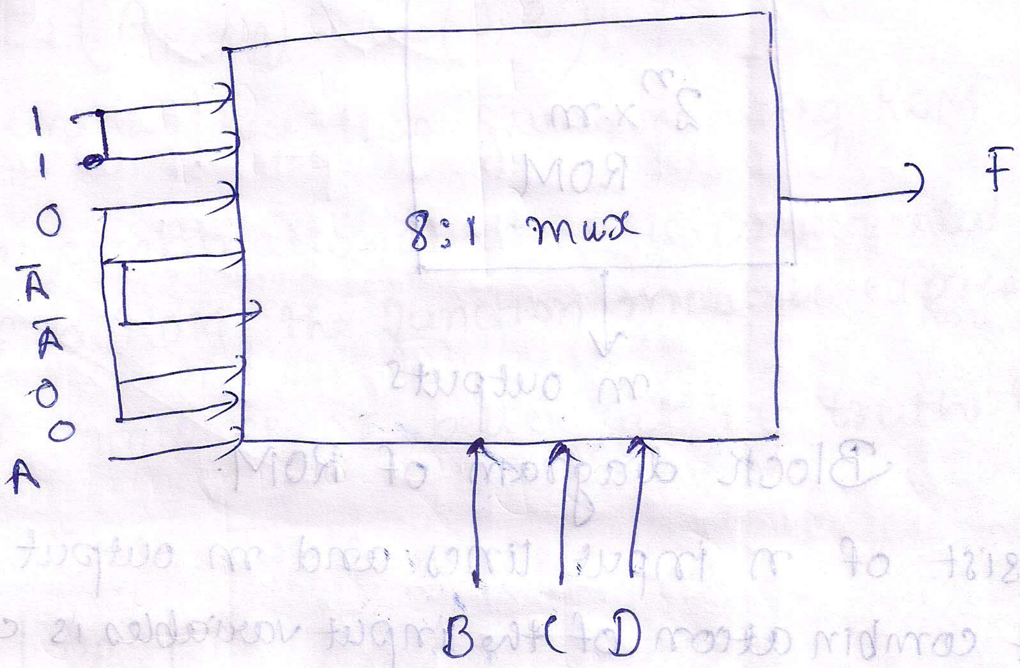
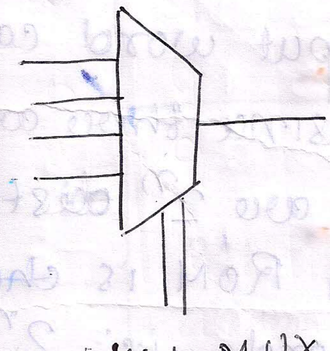
	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7
$\bar{A}$	0	1	2	3	4	5	6	7
A	8	9	10	11	12	13	14	15
	1	1	0	$\bar{A}$	$\bar{A}$	0	0	A



(join Combine common inputs)

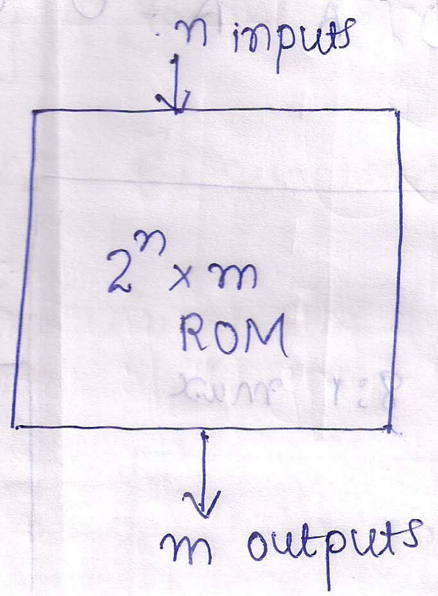
Symbol of MUX



4:1 MUX

READ ONLY MEMORY :- ROM

A ROM is a device that includes both the decoder and 'OR' GATES within a single IC package.



Block diagram of ROM

It consist of n input lines and m output lines. Each bit combination of the input variables is called an address. Each bit combination that comes out of the outp lines is called a word. The number of bits per word is equal to the no. of output lines m. An address is essentially a binary number that denotes one of the minterms of n variable. An output word can be selected by a unique address and since there are 2^n distinct addresses in a ROM, there are 2^n distinct wo which can be stored in the unit. A ROM is ~~characteri~~ Characterised by the number of words, i.e:- 2^n and the number of bits per word m.

E.g:- 32 × 8 ROM

$2^5 \times 8$

2^5 ↓ 5:32 decoder

8 ↓ 8 OR Gates

Que:- $F_1(A_1, A_0) = \Sigma(1,2,3)$

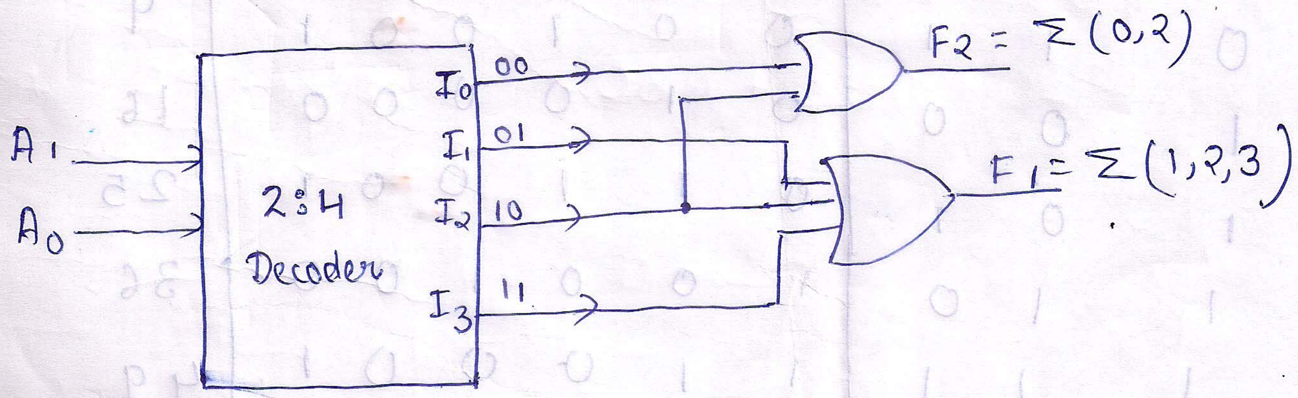
$F_2(A_1, A_0) = \Sigma(0,2)$

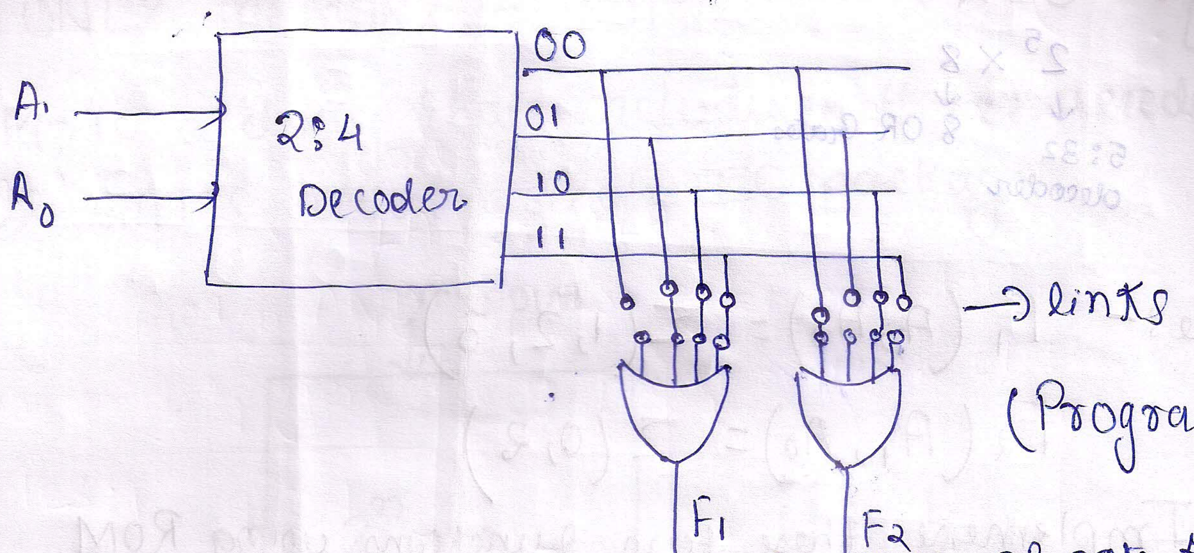
Implement these two functions using ROM

⇒ When a combinational circuit is implemented by means of a ROM, the function must be expressed in SUM of minterms or better get by truth table

Truth Table

A_1	A_0	F_1	F_2
0	0	0	1
0	1	1	0
1	0	1	1
1	1	1	0





If there is inverter at the output of the OR gate then link the complement of the given function.

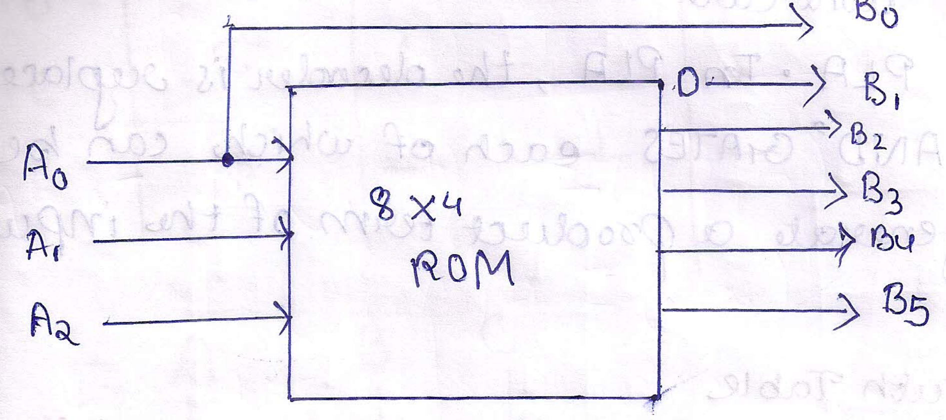
Design a combinational circuit using a ROM. The circuit accepts a 3 bit number and generates an output binary number equal to square of its number.

Truth Table

A_2	A_1	A_0	B_5	B_4	B_3	B_2	B_1	B_0	Decimal
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	1
0	1	0	0	0	0	1	0	0	4
0	1	1	0	0	1	0	0	1	9
1	0	0	0	1	0	0	0	0	16
1	0	1	0	1	1	0	0	1	25
1	1	0	1	0	0	1	0	0	36
1	1	1	1	1	0	0	0	1	49

$\because B_1 = 0$ (always) and $B_0 = A_0$

$\therefore$ ROM required is $2^3 \times 4 = 8 \times 4$



ROM Truth Table

A_2	A_1	A_0	B_5	B_4	B_3	B_2
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	0	0	1
0	1	1	0	0	1	0
1	0	0	0	1	0	0
1	0	1	0	1	1	0
1	1	0	1	0	0	1
1	1	1	1	1	0	0

$2 \underline{| 25}-1$
$2 \underline{| 12}-0$
$2 \underline{| 6}-0$
$2 \underline{| 3}-1$
1

$2 \underline{| 36}-0$
$2 \underline{| 18}-0$
$2 \underline{| 9}-1$
$2 \underline{| 4}-0$
$2 \underline{| 2}\ 0$
1

$2 \underline{| 49}-1$
$2 \underline{| 24}-0$
$2 \underline{| 12}-0$
$2 \underline{| 6}-0$
$2 \underline{| 3}-1$
1