

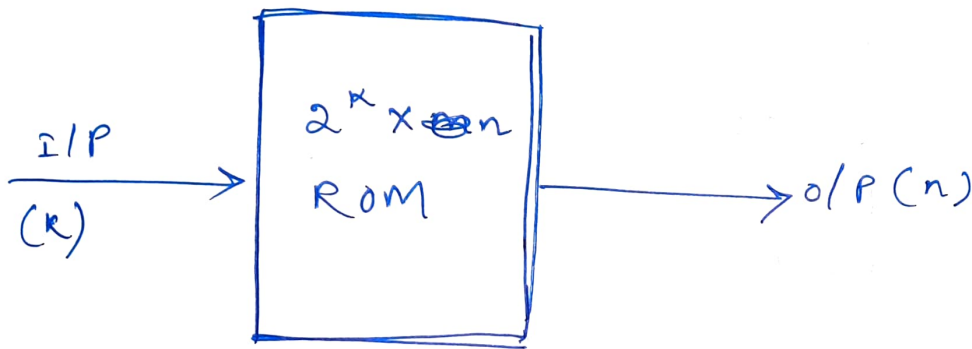
ROM:

(Read Only Memory). (fixed AND, fixed OR)

- it is a memory device where fixed binary information is stored.

- It includes decoder and OR gate.

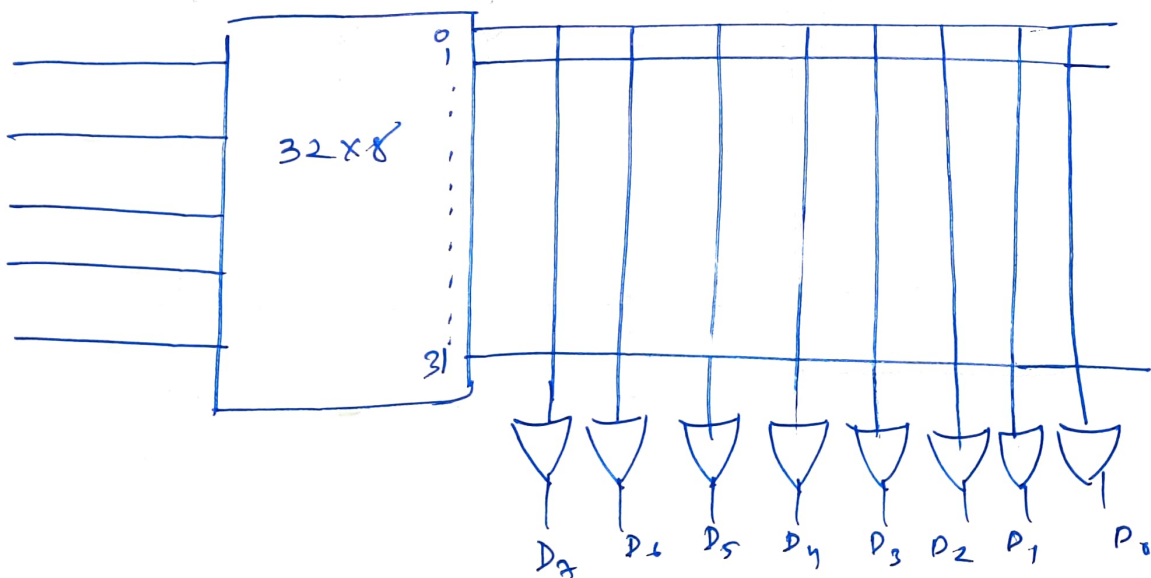
$$\downarrow$$
$$n \text{ I/P} \rightarrow 2^n \text{ O/P}$$



$n = \text{no. of bits in words.}$

ex. Design 32×8 ROM.

$$32 \times 8 = 2^5 \times 8 \quad 8 = 8 \text{ bit word / O/P}$$
$$5 = \text{I/P.}$$



ex. Design a logic diagram for 32×4 ROM.
for BCD to Excess 3.

Ans

~~Ans~~

BCD
a b c d
0 0 0 0

0 0 0 1

0 0 1 0

0 0 1 1

~~0 1 0 0~~

~~0 1 0 1~~

~~0 1 1 0~~

~~0 1 1 1~~

Excess-3

w x y z
0 0 1 1

0 1 0 0

0 1 0 1

0 1 1 0

~~0 1 1 1~~

~~1 0 0 0~~

~~1 0 0 1~~

~~1 0 1 1~~

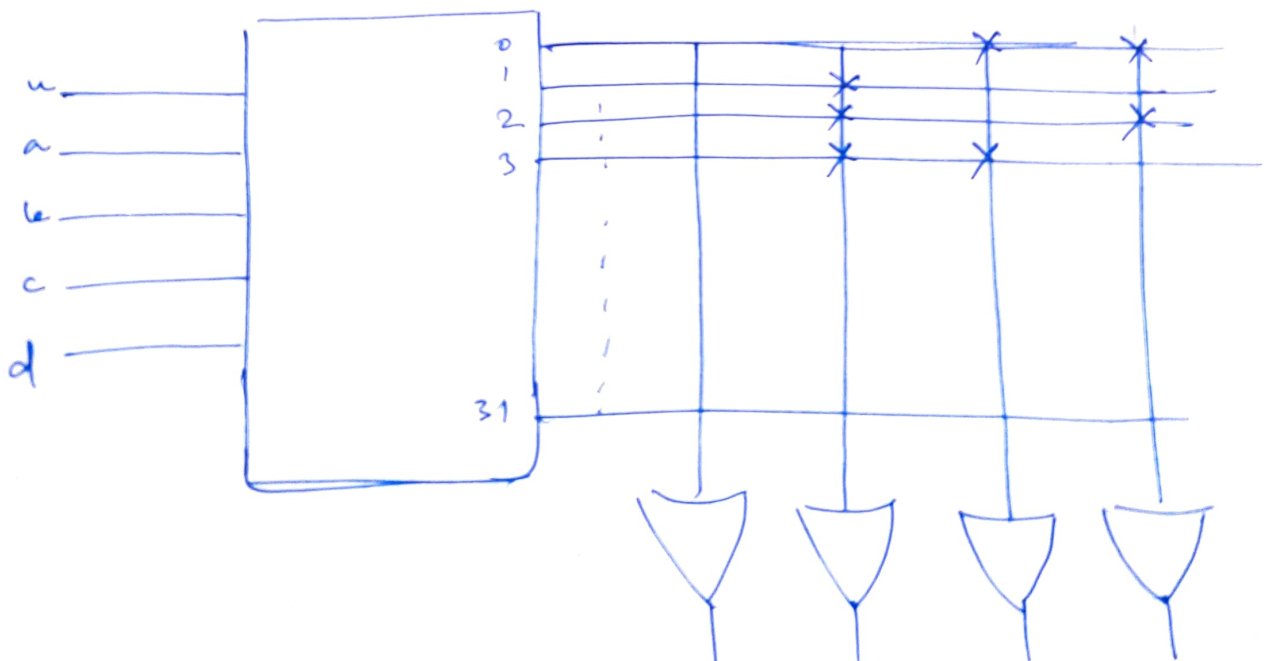
No. of bits = 4.

$$w = \sum m(0, 3)$$

$$x = \sum m(1, 2, 3)$$

$$y = \sum m(0, 3)$$

$$z = \sum m(0, 2)$$



ex. Implement the following truth table using Rom.

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

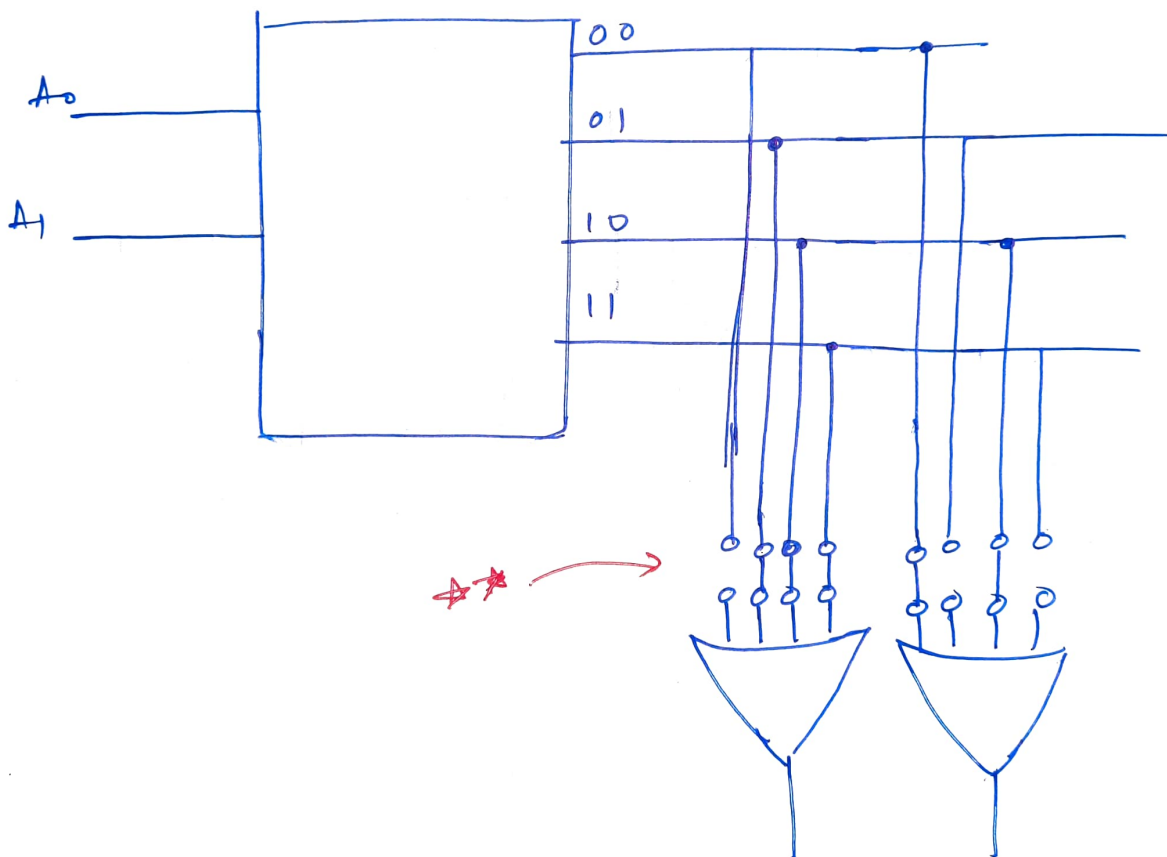
Ans. No. of bit words = 4.

No. of I/P = 2.

$\therefore \text{Rom} = 2^2 \times 4.$

$$F_1 = \sum m(0, 1, 2, 3)$$

$$F_2 = \sum m(0, 2)$$



Note: $0-0 \Rightarrow \text{join (1 in truth table)}$

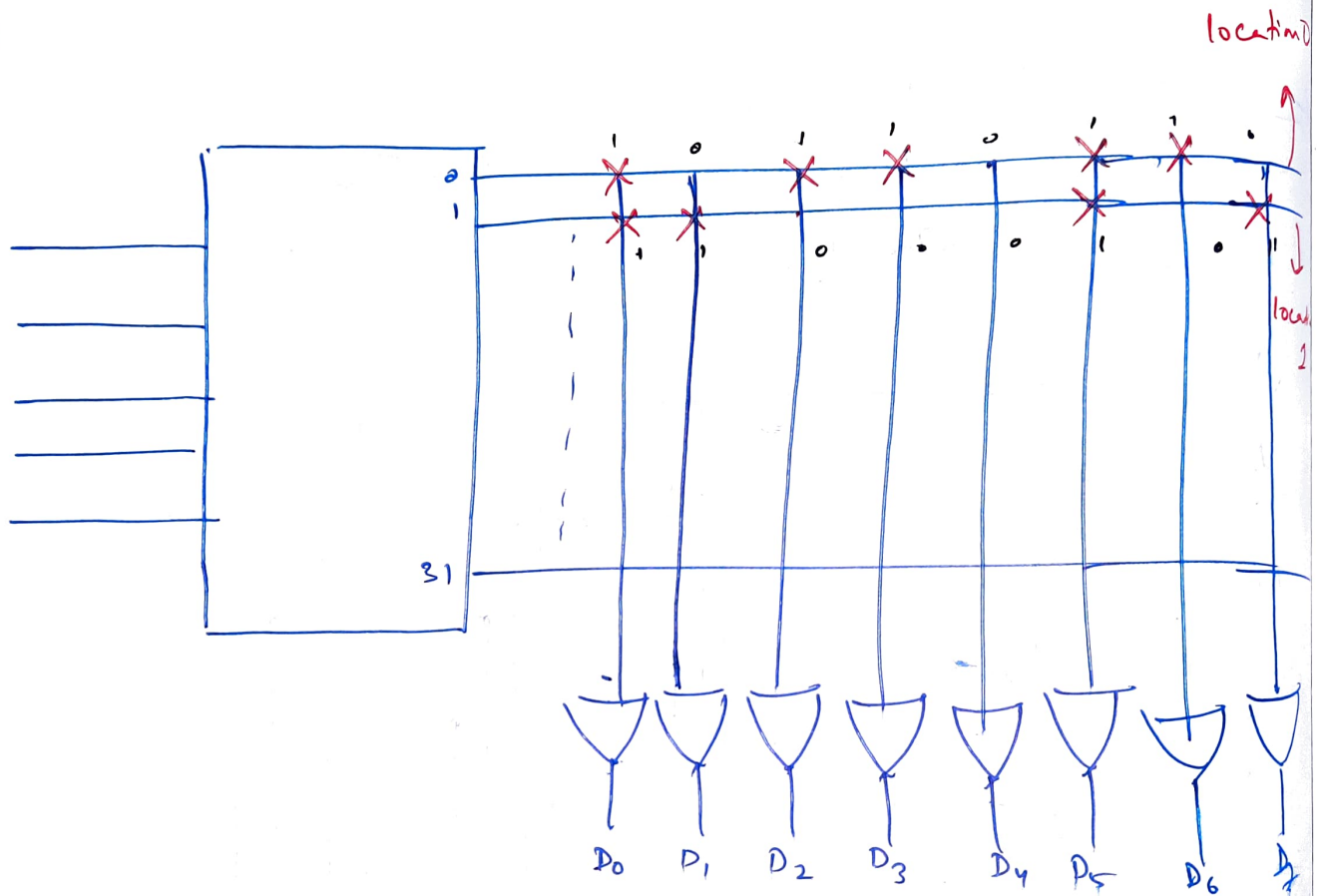
$0-0 \Rightarrow \text{Not join (0 in truth table)}$

Q. Draw the diagram and find the content at location 0 and location 1. in $2^5 \times 8$ ROM.

Location 0: 10110110

Location 1: 11000101

Ans.

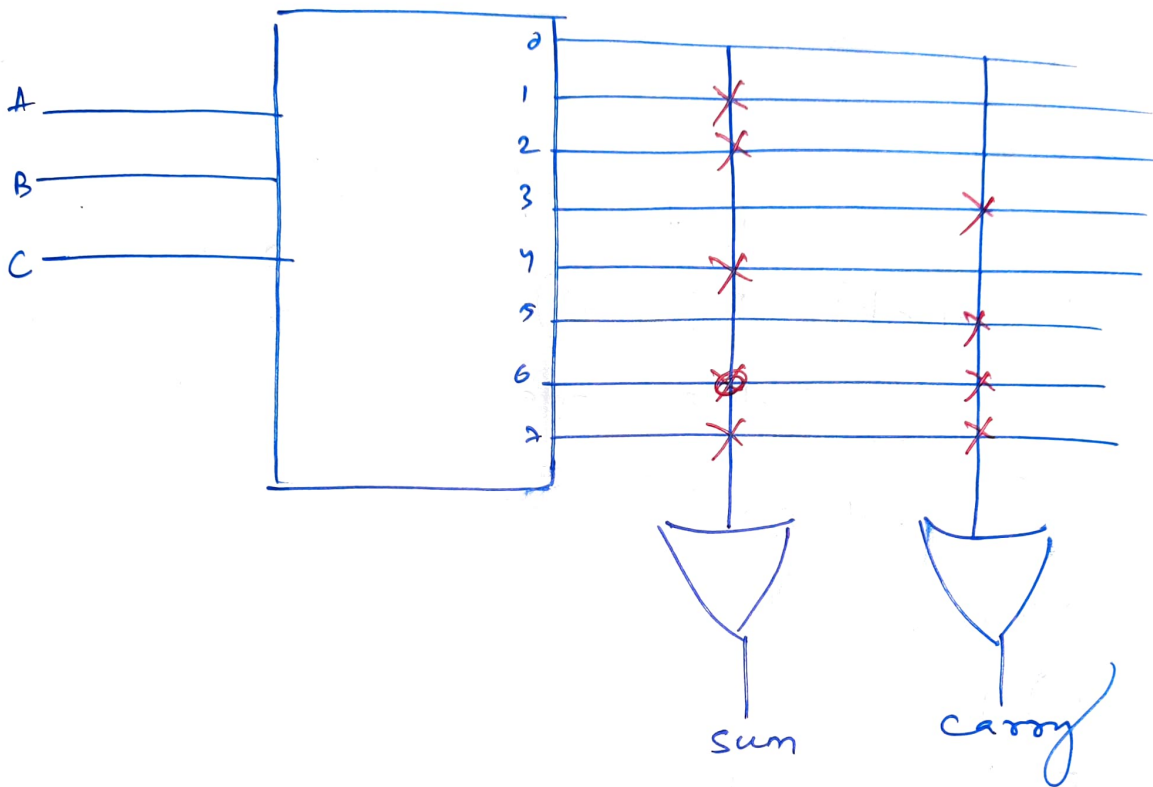


Full Adder using ROM:

$$\text{decoder} = 3 \times 8$$

$$\therefore \text{ROM} :- 32 \times 8 = 2^3 \times 8$$

$$\begin{aligned} \text{sum} &= \sum m(1, 2, 4, 7) \\ \text{carry} &= \sum m(3, 5, 6, 7) \end{aligned}$$



Q. Implement the following functions using Rom.

$$f_1(a, b, c) = \sum m(0, 1, 5, 7)$$

$$f_2(a, b, c) = ab' + c$$

$$f_3(a, b, c) = (a+b)(b+c')$$

Ans

$$f_1 = \sum m(0, 1, 5, 7) \quad \checkmark$$

$$f_2 = ab' + c$$

$$= ab'(c+c') + (a+a')(b+b')c$$

$$= ab'c + ab'c' + (a+a')(bc + b'c)$$

$$= \underset{001}{ab'c} + \underset{010}{ab'c'} + \underset{101}{abc} + \underset{110}{ab'c} + \underset{011}{a'bc} + \underset{001}{a'b'c}$$

$$= \sum m(1, 3, 4, 5, 7) \quad \checkmark$$

$$f_3 = (a+b)(b+c')$$

$$= (\bar{a}\bar{b}) + (\bar{b}c)$$

$$= \bar{a}\bar{b}(c+c') + (a+a')(\bar{b}c)$$

$$= \bar{a}\bar{b}c + \bar{a}\bar{b}c' + a\bar{b}c + a\bar{b}c$$

$$= \sum m(0, 1, 5) \quad \checkmark$$



