MEMORY INTERFACING IN 8086 µP ①

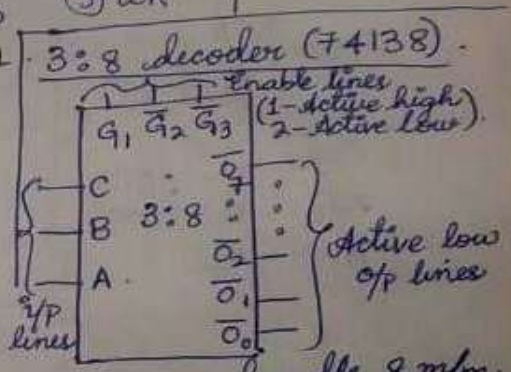
Memory chips < RAM (Read Write mem.)
ROM / EPROM (Read only mem.)

RAM	ROM
Read & Write	Read only
① $\overline{CE}$	① $\overline{CE}$
② $\overline{RD}$ ($\overline{OE}$)	② $\overline{RD}$ ($\overline{OE}$)
③ $\overline{WR}$	

RAM
6116 – 2K×8
6264 – 8K×8
62128 – 16K×8
62256 – 32K×8

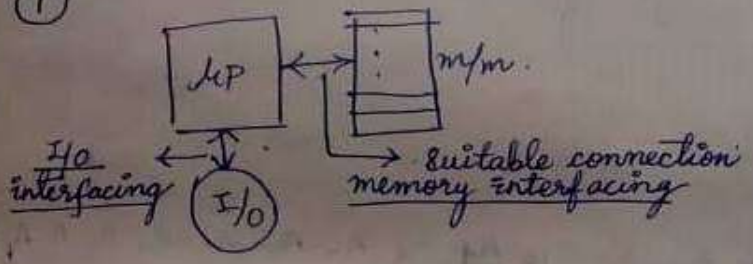
EPROMs
2708 – 1K×8 → 2^{10} ⑩ A-L.
2716 – 2K×8 → $2\times1K = 2^1\times2^{10} = 2^{11}$ ⑪ A-L
2732 – 4K×8 → 12 A-L
2764 – 8K×8 → 13 A-L
27128 – 16K×8 → 14 A-L
27256 – 32K×8 → 15 A-L
27512 – 64K×8 → 16 A-L

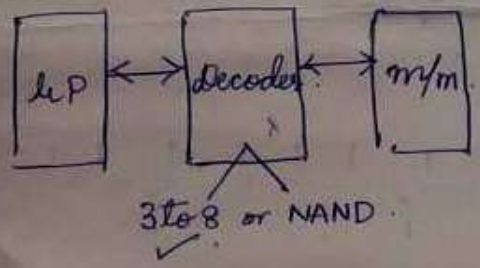
3:8 decoder (74138)



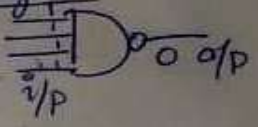
We can handle 8 m/m chips using one 74138.

C	B	A	o/p select
0	0	0	$\overline{O_0}$
0	0	1	$\overline{O_1}$
0	1	0	$\overline{O_2}$
0	1	1	$\overline{O_3}$
1	0	0	$\overline{O_4}$
1	0	1	$\overline{O_5}$
1	1	0	$\overline{O_6}$
1	1	1	$\overline{O_7}$

① 

② 

NAND gate



8086 → 16 bit data bus
20 bit address bus.

Memory bank
Odd (High) [$\overline{BHE}=0$]
Even (Low) [$A_0=0$]

$\overline{BHE}$	A_0 ($\overline{BLE}$)	
0	0	– both banks enabled – 16 bit transfer
0	1	– High (Odd) bank enabled – 8 bit
1	0	– Even (Low) bank enabled – "
1	1	– No bank

Interface (16K × 8) memory locations for 8086 µP.

$\frac{16K}{2}$ = 8K Odd & 8K Even mem. bank.

8 × 1K = $2^3 \times 2^{10}$ = 2^{13} A.L

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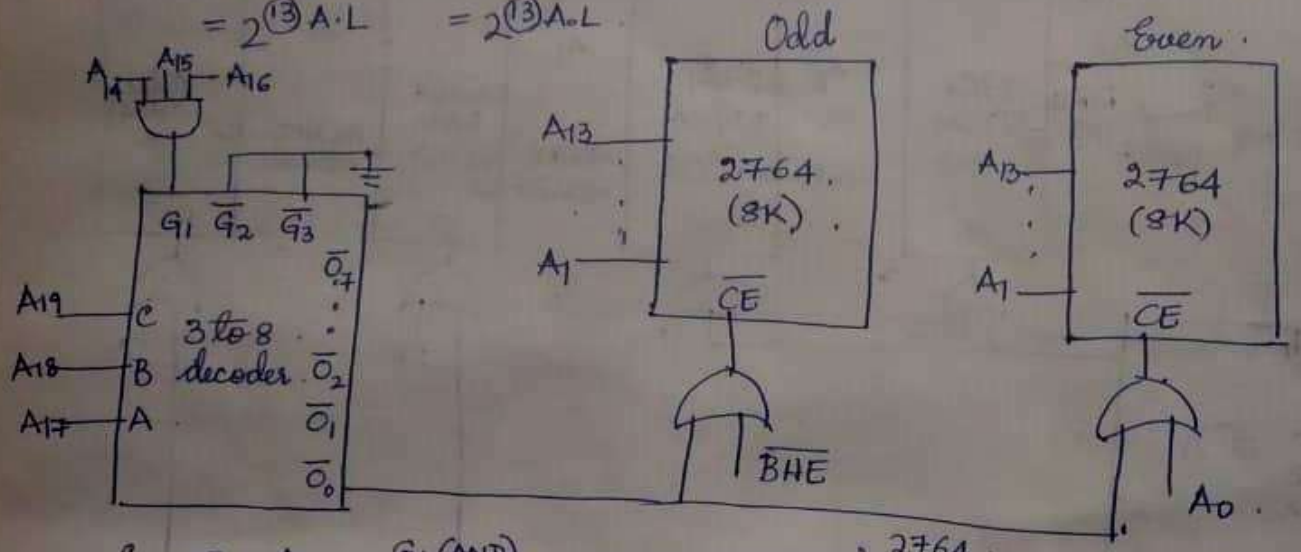
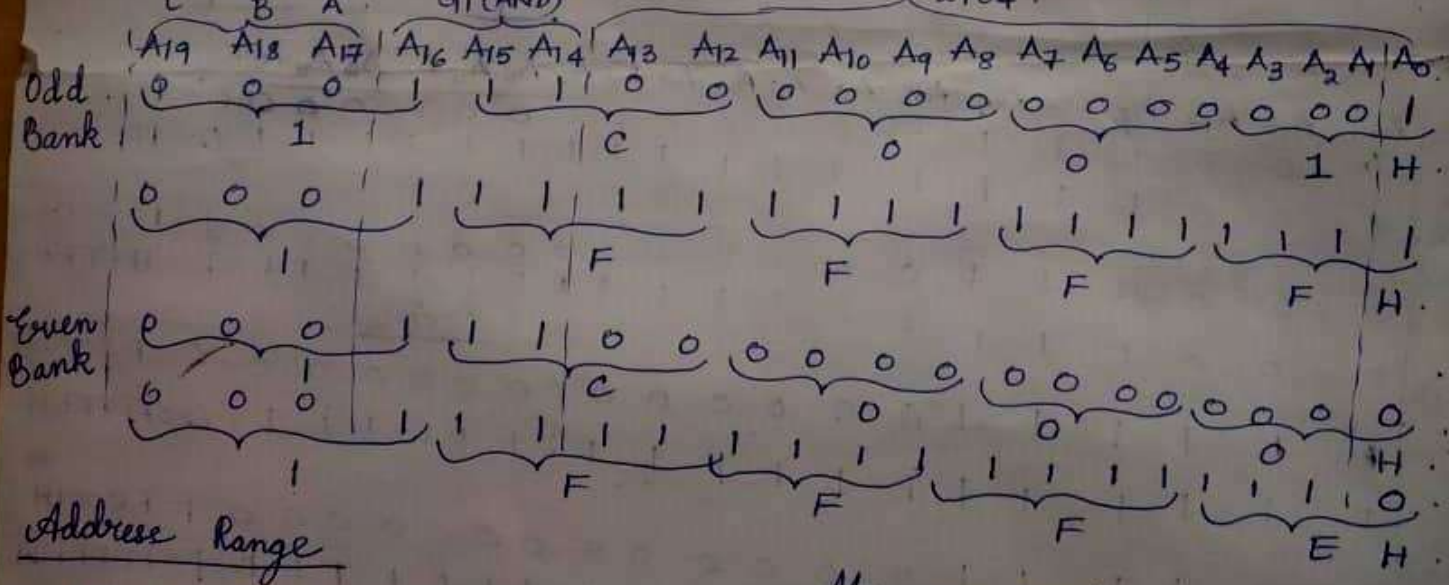


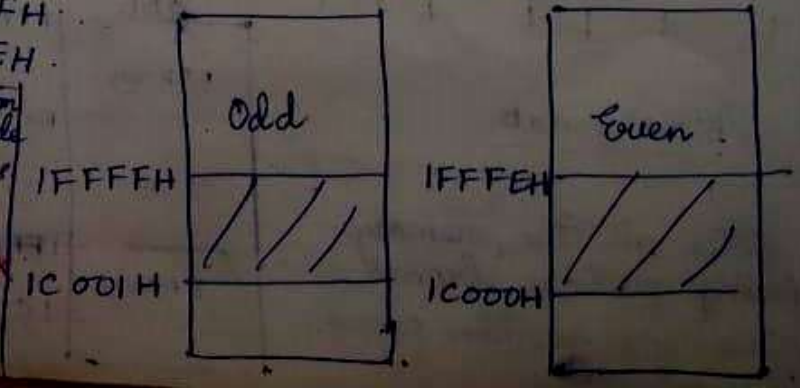


Address Range

Odd Bank :- 1C001H → 1FFFFH.

Even Bank :- 1C000H → 1FFFEH.

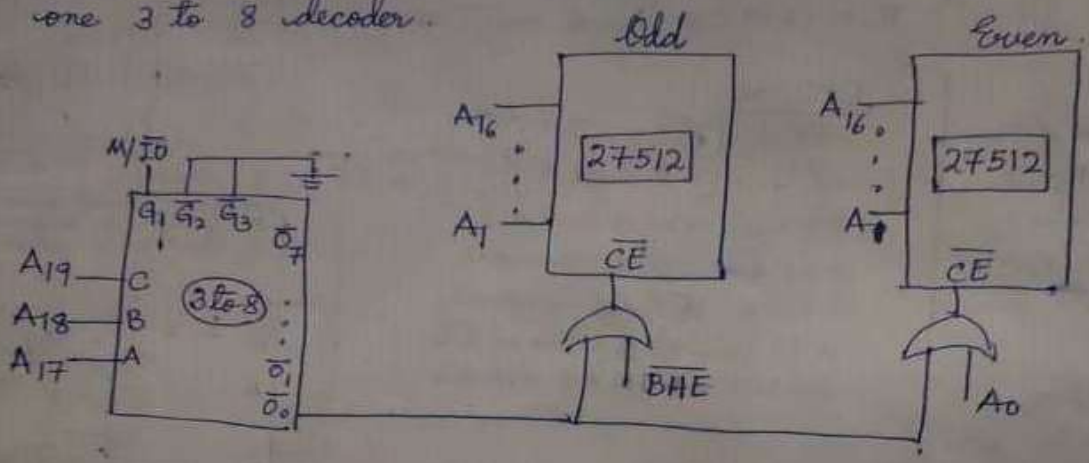
Memory map.



ASSIGNMENT : Design an 8086 system to interface 32K×8 RAM in minimum mode using 3 to 8 decoder. Starting address of RAM space → = 40000H / 80000 / F0,000H

Also draw the memo. map.

Q1) Interface 8086 with 2 no.s of 27512 (64K × 8) chip using one 3 to 8 decoder.



27512 = 64K × 8

$2^6 \times 2^{10} = 2^{16}$ A.L.

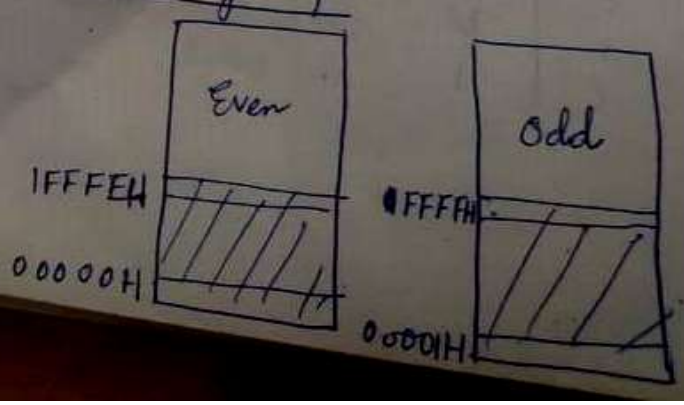
C	B	A															
A_{19}	A_{18}	A_{17}	A_{16}	A_{15}	A_{14}	A_{13}	A_{12}	A_{11}	A_{10}	A_9	A_8	A_7	A_6	A_5	A_4	A_3	A_2	A_1	A_0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0		0		0		0		0		0		0		0		0 H (Even)
0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
			1		F		F		F		F		F		E		H		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1 (Even)
			0		0		0		0		0		0		0		0		1 H
0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1 (Odd)
			1		F		F		F		F		F		F		H		

Address Range

For odd → 00001H – 1FFFFH.

For even → 00000H – 1FFFEH.

Memory map

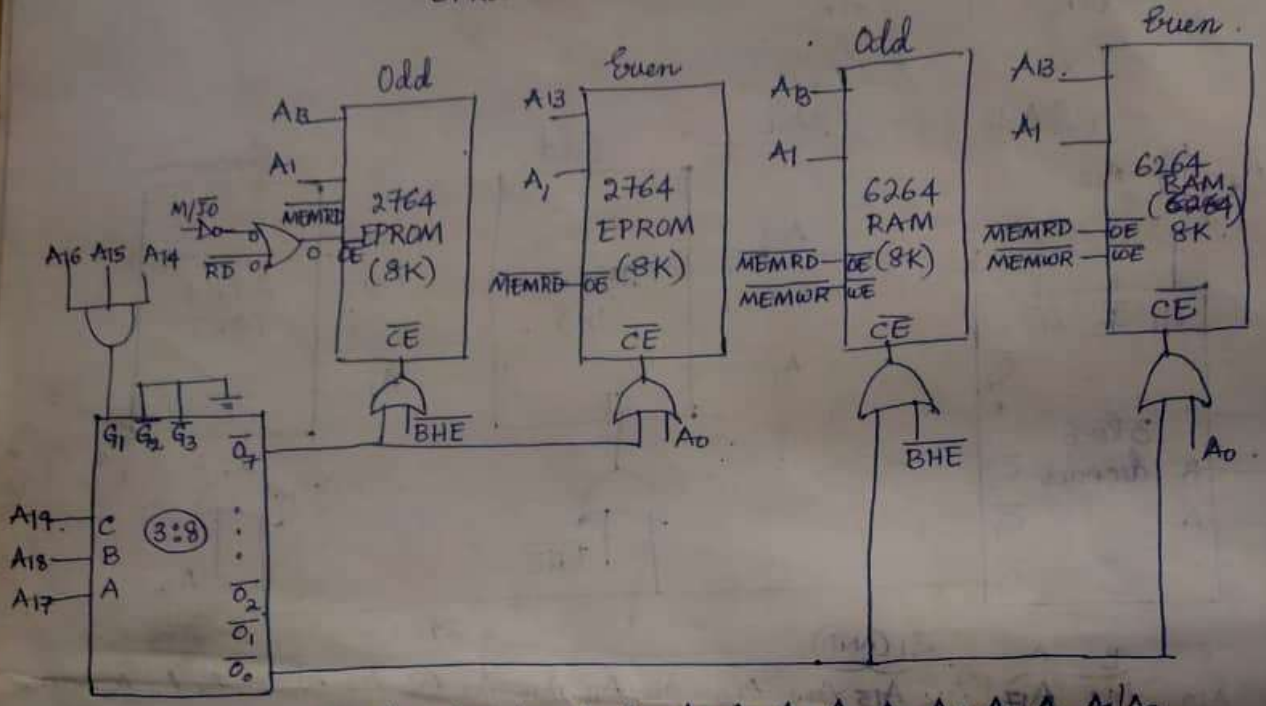


(Q3) Interface 16K EPROM and 16K RAM to 8086.

8K = 8 X 1K = $2^3 \times 2^{10} = 2^{13}$

16K EPROM ⇓ 8K even + 8K odd EPROM.

16K RAM ⇓ 8K even + 8K odd RAM.



	A19	A18	A17	A16	A15	A14	A13	A12	A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1	A0	
RAM (Even)	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 = 1C000H
	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0 = 1FFFEH
RAM (Odd)	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1 = 1C001H
	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1 = 1FFFFH
EPROM (Even)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 = FC000H
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0 = FFFFEH
EPROM (Odd)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1 = FC001H
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1 = FFFFFH

Memory map

H.W Solve all the 8086 memory interfacing questions from previous yrs. question papers.