

Memory design

$$\text{memory} = N \times w$$

$$\text{Required memory} = N' \times w'$$

$$\text{where } N' \geq N, w' \geq w$$

3. types of organization of $N' \times w'$ can be formed $N \times w$

$$1) 1024 \times 8$$

$$2048 \times 8$$

Case 1

$$\text{if } N' > N \text{ \& } w' = w$$

Increase number by factor $P = \frac{N'}{N}$

Case 2

$$\text{if } N' \geq N \text{ \& } w' > w$$

Increase the word size by factor $Q = \frac{w'}{w}$

Case 3if $N' > N$ & $W' > W$ Increase no. of words by factor of P Increase the word size of a memory by the factor q .7) Design 1024×8 - bit RAM using 256×8 - bit RAMCase 1 $N' > N$ & $W' = W$

if

$$P = \frac{1024}{256} = 4 \quad q = 8/8 = 1$$

$$P \times q = 4$$

S.NO	mem	$N \times W$	$N' \times W'$	P	q	$P \times q$	no. of 2
1	RAM	256×8	1024×8	4	1	4	$8 \times 2 =$

512 x 32 \Rightarrow required

256 x 8 \Rightarrow available

Case 3:-

$$N' > N, \quad w' > w$$

$$P = \frac{N'}{N} = \frac{512}{256} = 2$$

$$\boxed{P = 2}$$

$$Q = \frac{w'}{w} = \frac{32}{8} = 4$$

$$\boxed{Q = 4}$$

	$N' \times w'$	$N \times w$	P	Q	$P \times Q$
1. RAM	512 x 32	256 x 8	2	4	8

x	y	z	Total			
1	2	1	54	P	Q	$P \times Q$
ROM	256 x 32	128 x 8		2	4	8

Date _____

Expt. No. _____

Page No. _____

1) $512 \times 32 \Rightarrow$ required } = RAM
 $256 \times 8 \Rightarrow$ available }

Reg no: 19M100021

$256 \times 32 \Rightarrow$ req } = ROM
 $128 \times 8 \Rightarrow$ available }

For RAM:-

case 3:- $N' > N$, $w' > w$

$$P = N' / N$$

$$= \frac{512}{256} = 2$$

$$Q = w' / w$$

$$= 32 / 8 = 4$$

$P = 2$

$Q = 4$

				P	Q	P*Q	x	y	z	Total
1	RAM	512×32	256×8	2	4	8	1	2	1	4
2	ROM	256×32	128×8	2	4	8	1	2	1	4

Teacher's Signature _____

CAO
Attendance

1 2 3 4
11
64
7
1

RAM $\Rightarrow 256 \times 32$ using 128×8

ROM $\Rightarrow 128 \times 16$ using 64×8

interface $\Rightarrow 1024 \times 32$ using 256×8

Regno: 19M1P0021

Name: Hrithik Hem
Sundar

RAM:-

$$P = \frac{256}{128} = 2$$

$$P = 2$$

$$q = \frac{32}{8} = 4$$

$$q = 4$$

ROM:-

$$P = \frac{128}{64} = 2$$

$$P = 2$$

$$q = \frac{16}{8} = 2$$

$$q = 2$$

interface

$$P = \frac{1024}{256} = 4$$

$$P = 4$$

$$q = \frac{32}{8} = 4$$

$$q = 4$$

	$N \times W$	$N' \times W'$	P	q	$P \times q$	x	y	z	Total
1 RAM	128×8	256×32	2	4	8	7	1	2	10
2 ROM	64×8	128×16	2	2	4	6	1	2	9
3 Interface	256×8	1024×32	4	4	16	8	2	2	12

RAM:-

2 x 4

	1	2	3	4
1	1.1	1.2	1.3	1.4
2	2.1	2.2	2.3	2.4

ROM:-

2 x 2

	1	2
1	1.1	1.2
2	2.1	2.2

Interface

4 x 4

	1	2	3	4
1	1.1	1.2	1.3	1.4
2	2.1	2.2	2.3	2.4
3	3.1	3.2	3.3	3.4
4	4.1	4.2	4.3	4.4

Component	Hexadecimal address		Address bus															
	From	To	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
RAM1.1	0000	007F						0	0	0	0		x	x	x	x	x	x
RAM1.2	0000	007F						0	0	0	0		x	x	x	x	x	x
RAM1.3	0000	007F						0	0	0	0		x	x	x	x	x	x
RAM1.4	0000	007F						0	0	0	0		x	x	x	x	x	x
RAM2.1	0200	027F						0	0	1	0		x	x	x	x	x	x
RAM2.2	0200	027F						0	0	1	0		x	x	x	x	x	x
RAM2.3	0200	027F						0	0	1	0		x	x	x	x	x	x
RAM2.4	0200	027F						0	0	1	0		x	x	x	x	x	x
ROM1.1	0400	043F						0	1	0	0		0	x	x	x	x	x
ROM1.2	0400	043F						0	1	0	0		0	x	x	x	x	x
ROM2.1	0600	043F						0	1	1	0		0	x	x	x	x	x
ROM2.2	0600	043F						0	1	1	0		0	x	x	x	x	x
Int1.1	0800	08FF						1	0	0	0		x	x	x	x	x	x
Int1.2	0800	08FF						1	0	0	0		x	x	x	x	x	x

NAME
HRITHIK
HEM
SUNDAR
REGN
19MIDD

NAME
HRITHIK
HEM
SUNDAR
REGN
19M100

Int1.3	0800	08FF						1	0	0	0		x	x	x	x	x	x
Int1.4	0800	08FF						1	0	0	0		x	x	x	x	x	x
Int2.1	0900	09FF						1	0	0	1		x	x	x	x	x	x
Int2.2	0900	09FF						1	0	0	1		x	x	x	x	x	x
Int2.3	0900	09FF						1	0	0	1		x	x	x	x	x	x
Int2.4	0900	09FF						1	0	0	1		x	x	x	x	x	x
Int3.1	0A00	0AFF						1	0	1	0		x	x	x	x	x	x
Int3.2	0A00	0AFF						1	0	1	0		x	x	x	x	x	x
Int3.3	0A00	0AFF						1	0	1	0		x	x	x	x	x	x
Int3.4	0A00	0AFF						1	0	1	0		x	x	x	x	x	x
Int4.1	0B00	0BFF						1	0	1	1		x	x	x	x	x	x
Int4.2	0B00	0BFF						1	0	1	1		x	x	x	x	x	x
Int4.3	0B00	0BFF						1	0	1	1		x	x	x	x	x	x
Int4.4	0B00	0BFF						1	0	1	1		x	x	x	x	x	x

Teacher's Signature

Expt No.

Date
Page No.

NAME: HRITHICHEM SUNDAR-B

REGNO: 19MID0021

date / /

11 10 9 8 7 6 5 4

0
1
2
3
4
5
6

RAM
1-1

RAM
1-2

RAM
1-3

RAM
1-4

RAM
2-1

RAM
2-2

RAM
2-3

RAM
2-4

ROM
1-1

ROM
1-2

ROM
2-1

ROM
2-2

1-to-2 decoder

Int
1-1

Int
1-2

Int
1-3

Int
1-4

Int
2-1

Int
2-2

Int
2-3

Int
2-4

Int
3-1

Int
3-2

Int
3-3

Int
3-4

Int
4-1

Int
4-2

Int
4-3

Int
4-4

Teacher's Signature

Expt. No.

Page No.

Date