

COSC 211 Lab 8

Benjamin Scown

S/N: 62071873

Computer Science

Question 1

a) 5.2.1

Top four bits are the tag, bottom four bits are the index

Word Address	0x03	0xb4	0x2b	0x02	0xbf	0x58	0xbe	0x0e	0xb5	0x2c	0xba	0xfd
Binary Address	0000 0011	1011 0100	0010 1011	0000 0010	1011 1111	0101 1000	1011 1110	0000 1110	1011 0101	0010 1100	1011 1010	1111 1101
Tag	0000	1011	0010	0000	1011	0101	1011	0000	1011	0010	1011	1111
Index	0011	0100	1011	0010	1111	1000	1110	1110	0101	1100	1010	1101
Hit/Miss (Left to Right)	Miss	Miss	Miss	Miss	Miss	Miss	Miss	Miss	Miss	Miss	Miss	Miss

b) 5.2.2

Shift binary addresses to the right because of doubled block size and halved number of blocks, top 4 bits are the tag, bottom 3 are the index

Word Address	0x03	0xb4	0x2b	0x02	0xbf	0x58	0xbe	0x0e	0xb5	0x2c	0xba	0xfd
Binary Address	0000 0011	1011 0100	0010 1011	0000 0010	1011 1111	0101 1000	1011 1110	0000 1110	1011 0101	0010 1100	1011 1010	1111 1101
Tag	0000	1011	0010	0000	1011	0101	1011	0000	1011	0010	1011	1111
Index	001	010	101	001	111	100	111	111	010	110	101	110
Hit/Miss (Left to Right)	Miss	Miss	Miss	Hit	Miss	Miss	Hit	Miss	Hit	Miss	Miss	Miss

Question 5

a)

The rotational latency is given by

$$\text{Rotational Latency} = \frac{0.5 \text{ rotations}}{\text{Revolutions Per Second}}$$

With 10000 RPM,

$$\text{Rotational Latency} = \frac{0.5 \text{ rotations}}{10000 \text{ RPM} * \frac{60 \text{ seconds}}{1 \text{ minute}}}$$

$$\text{Rotational Latency} = 0.00000833 \text{ seconds} = 833\text{ns}$$

b)

To find the transfer time for 1 sector, we multiply the number of bytes per sector by the time that it takes to transfer 1 byte.

If 1 MB is equal to 1 000 000 bytes, then our transfer rate of 1000MB/second is equal to a transfer rate of 100 000 000 bytes/second. Taking the reciprocal gives us the transfer time for 1 byte, 0.00000001 seconds.

$$100\text{MB/s} = 100000000 \text{ Bytes/s}$$

$$\text{Seconds/Sector} = \frac{1}{100000000 \frac{\text{Bytes}}{\text{Second}}} * 512 \text{ Bytes} = 0.00000512 \text{ Seconds/Sector}$$

c)

Using the formula given in the question,

$$\text{Average Read Time} = 0.008s + 0.00000833s + 0.00000512s + 0.002s = 0.01001345s$$

or, 10.01345ms