IN1006 Systems Architecture (PRD1 A 2022/23)

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State	Finished
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Time taken	10 mins 41 secs
Grade	10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

In performing a bit-wise addition of the following unsigned binary numbers, how many "carry out" bits will be generated?

0 1 0 0 1 0 1 1

0 0 1 0 1 0 0 1

- a. 3 "carried out" bits will be produced.
- b. 4 "carried out" bits will be produced.
- c. 0 "carried out" bits will be produced.
- d. 5 "carried out" bits will be produced.
- e. 1 "carried out" bits will be produced.

Correct. The three carry out bits will be produced when adding first, second and fourth pairs of bits of the given numbers from the right.

Your answer is correct.

The correct answer is:
3 "carried out" bits will be produced.

Question 2

Correct

Mark 1.00 out of 1.00

What is the numeric range of an 8-bit binary number in 2's complement arithmetic?

Select one:

- a. 0...255
- b. 0...7
- c. -127 ... 127
- d. -128 ...127 ✔
- e. -128 ... 128
- f. Don't know/no answer

We represent the negative values in the range -128 through -1 and the positive values in the range 0 through 127 with a single 8-bit byte, so -128 ... 127.

The correct answer is: -128 ...127

Question 3

Correct

Mark 1.00 out of 1.00

What is the numeric range of an 8-bit signed magnitude binary number?

Select one:

- a. 0...7
- b. -255...256
- c. Don't know/no answer
- d. 0...255
- e. -128 ... 127
- f. -127...127 ✔

We represent the negative values in the range -127 through -1 and the positive values in the range 0 through 127 with a single 8-bit byte.

The correct answer is: -127...127

Question 4

Correct

Mark 1.00 out of 1.00

What is the correct hexadecimal representation for the binary number 11110110? You do not need to give the subscript (h). All possible answers below are in hexadecimal representation.

Select one:

- a. F6 ✔
- b. 87
- c. E6
- d. D6
- e. F1
- f. Don't know/no answer

The most straightforward approach is to consider the binary word four bits at a time as shown in the table.

Binary	1111	0110
Hexadecimal	F	6

The correct answer is: F6

Question 5

Correct

Mark 1.00 out of 1.00

What is the numeric range of an 4-bit signed magnitude binary number?

Select one:

- a. -127...127
- b. 0...7
- c. -255...256
- d. 0...255
- e. None of the listed options. ✔
- f. -128 ... 127

Your answer is correct.

The correct answer is: None of the listed options.

Question 6

Correct

Mark 3.00 out of 3.00

Which of the following binary numbers corresponds to the result of the following subtraction of hexadecimal numbers (hint: transform the hexadecimal numbers to binary and perform subtraction as addition of the 2's complement the number to be subtracted):

77_{hex} - 42_{hex}

- a. 0011 0101 ✔ Correct answer.
- b. 0000 0111
- c. 0111 0111
- d. 0111 1100
- e. 0001 1111

Your answer is correct.

77_{hex} - 42_{hex}

The binary form of 77_{hex} is: 0111 0111

The binary form of 42_{hex} is: 0100 0010

Subtracting 42_{hex} from 77_{hex} can be carried out by additing the 2's complement of 42_{hex} to 77_{hex}.

To find the 2's complement of 42_{hex} we first flip the bits of its binary representation. This gives us: 1011 1101 (flip bits)

And then we add 1, so we get:

1011 1101

\+ 1

This gives us:

1011 1110 (i.e., the 2's complement of 42_{hex})

Then we perform the addition:

0111 0111 (77_{hex})

\+ 1011 1110 (i.e., the 2's complement of 42_{hex})

The result of this addition is

0011 0101

and as the left most bit is 0 the number is a positive one and therefore it constitutes the answer.

The correct answer is:
0011 0101

Question 7

Correct

Mark 1.00 out of 1.00

Which of the following 8-bit binary numbers represents number 77 in the decimal system (select one answer)?

- a. 0 1 0 0 1 1 0 1 ✔ Correct answer.
- b. 1 1 0 0 1 1 0 1
- c. 1 1 1 0 1 0 1 0
- d. None of the rest of the choices
- e. 0 1 1 0 1 1 0 0

Your answer is correct.

The correct answer is:

0 1 0 0 1 1 0 1

Question 8

Correct

Mark 1.00 out of 1.00

What is the equivalent decimal number of the binary number 10000001 written in 2's complement?

Select one:

- a. Don't know/no answer
- b. 1
- c. -127 ✔
- d. 129
- e. 130
- f. -128

In 2's complement we do:

10000001

01111110 (flip the bits)

0000001 (add 1)

01111111, the decimal value is: 127

But, the MSB of the original number is 1 so, this is a negative number:

-127

The correct answer is: -127

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