IN1006 Systems Architecture (PRD1 A 2022/23)

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State	Finished
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Time taken	15 mins 1 sec
Grade	**4.90** out of 10.00 (**49**%)

Question **1**

Correct

Mark 1.00 out of 1.00

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

Select one:

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

Your answer is correct.

The correct answer is: None of the listed options.

Question **2**

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. None of the rest of the choices
- b. 1 1 1 0 1 0 1 0
- c. 0 1 0 0 1 1 0 1 ✔ Correct answer.
- d. 1 1 0 0 1 1 0 1
- 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 **3**

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

Your answer is correct.

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 **4**

Incorrect

Mark 0.00 out of 1.00

What is the correct result of the operation below? The initial numbers should be considered as unsigned integers. The result should be given in 2's complement. (Hint: use 2's complement arithmetic to perform the operation.)

00001111 - 00010101

Select one:

- a. 11101011
- b. 00000101
- c. Don't know/no answer ✖
- d. 00000110
- e. 11101010
- f. 11111010

To perform the subtraction we find the negative of the subtrahend:

00010101 (subtrahend)

11101010 (1's complement, flip one bit)

00000001 (add 1)

11101011 (2's complement of the subtrahend)

perform the addition:

00001111

11101011 +

11111010 (this is the result in 2's complement or -6 in decimal

The correct answer is: 11111010

Question **5**

Incorrect

Mark 0.00 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):

62_{hex} - 39_{hex}

- a. 0000 1111
- b. 0011 1001
- c. 0111 0000
- d. 1010 1010 ✖ Incorrect answer.
- e. 0010 1001

Your answer is incorrect.

The binary form of 62_{hex} is: 0110 0010

The binary form of 39_{hex} is: 0011 1001

Subtracting 39_{hex} from 62_{hex} can be carried out by adding the 2's complement of 39_{hex} to 62_{hex}.

To find the 2's complement of 39_{hex} we first flip the bits of its binary representation. This gives us: 1100 0110 (flip bits)

And then we add 1, so we get:

1100 0110

\+ 1

This gives us:

1100 0111 (i.e., the 2's complement of 39_{hex})

Then we perform the addition:

0110 0010 (62_{hex})

\+ 1100 0111 (i.e., the 2's complement of 39_{hex})

The result of this addition is

0011 1101

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

The correct answer is:
0010 1001

Question **6**

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. 4 "carried out" bits will be produced.

b. 1 "carried out" bits will be produced.

c. 3 "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.

d. 0 "carried out" bits will be produced.

e. 5 "carried out" bits will be produced.

Your answer is correct.

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

Question **7**

Correct

Mark 1.00 out of 1.00

What are the binary and decimal representations of the hexadecimal number F4?

Select one:

a. Binary: 11110010 Decimal: 244

b. Binary: 11100100 Decimal: 244

c. Binary: 11110100 Decimal: 240

d. Binary: 11110100 Decimal: 244 ✔

e. Don't know/No answer

To convert from base 16, we remember that $F4_h$ means

F x 16^1 + 4 x 16^0

15 x 16 + 4 x 1

240 + 4

244_{10}

The correct answer is: Binary: 11110100 Decimal: 244

Question **8**

Incorrect

Mark -0.10 out of 1.00

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

Select one:

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

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

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