IN1006 Systems Architecture (PRD1 A 2022/23)

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State	Finished
Completed on	Thursday, 10 November 2022, 3:58 PM
Time taken	8 mins 45 secs
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

What is the equivalent decimal number of the binary number 10000001 which is written in signed magnitude?

Select one:
- ⚪ a. Don't know/no answer
- ⚪ b. -127
- ⚪ c. 1
- ⦿ d. -1   ✔
- ⚪ e. -128
- ⚪ f. 129

The MSB is "1" so this is a negative number.

The next 7 bits correspond to the magnitude: 1

So, -1

The correct answer is: -1

What is the correct hexadecimal representation for the binary number 01011101? All answers below are given in hexadecimal representation and we omit the (h) subscript.

Select one:

- a. D5
- b. 5D ✔
- c. 5C
- d. Don't know/no answer
- e. 4D
- f. 5E

The most straightforward approach is to consider the binary word four bits at a time as shown in the table.
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Binary	0101	1101
Hexadecimal	5	D

The correct answer is: 5D

Which of the following numbers is the octal number representing number 20 in the decimal system (select one answer)?

- a. 10
- b. 66
- c. 16
- d. 44
- e. 24 ✔ Correct.

Your answer is correct.

The correct answer is:
24

Question **4**
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.   -128
- b.   -127 ✔
- c.   129
- d.   Don't know/no answer
- e.   130
- f.   1

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

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):

AE$_{hex}$ - 9F$_{hex}$

- ○ a. 0101 0101
- ○ b. 0110 0100
- ○ c. 0000 0001
- ⦿ d. 0000 1111   ✔ This is the correct answer.
- ○ e. 0000 0101

Your answer is correct.

The binary form of AE$_{hex}$ is: 1010 1110

The binary form of 9F$_{hex}$ is: 1001 1111

Subtracting 9F from AE can be carried out by auditing the 2's complement of 9F$_{hex}$ to AE$_{hex}$.

To find the complement of 9F$_{hex}$ we first flip the bits of its binary representation. This gives us: 0110 0000 (flip bits)

And then we add 1, so we get:

0110 0000

+   1

This gives us:

0110 0001 (i.e., the 2's complement of 9F$_{hex}$)

Then we perform the addition:

1 0 1 0 1 1 1 0   AE$_{hex}$

0 1 1 0 0 0 0 1   (addition of 2's complement of 9F$_{hex}$)

The result of this addition is

0000 1111

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

The correct answer is:
0000 1111

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

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

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. 5 "carried out" bits will be produced.
- b. 4 "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. 1 "carried out" bits will be produced.

Your answer is correct.

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

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

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

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