

# IN1006 Systems Architecture (PRD1 A 2022/23)

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**Started on** Thursday, 10 November 2022, 4:13 PM

**State** Finished

**Completed on** Thursday, 10 November 2022, 4:25 PM

**Time taken** 12 mins 45 secs

**Grade** 8.90 out of 10.00 (89%)

## Question 1

Correct

Mark 1.00 out of 1.00

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

Select one:

- ☐ a. Don't know/No answer
- ☐ b. Binary: 11100100    Decimal: 244
- ☒ c. Binary: 11110100    Decimal: 244
- ☐ d. Binary: 11110010    Decimal: 244
- ☐ e. Binary: 11110100    Decimal: 240



Your answer is correct.

To convert from base 16, we remember that  $F4_{16}$  means

$$F \times 16^1 + 4 \times 16^0$$

$$15 \times 16 + 4 \times 1$$

$$240 + 4$$

$$244_{10}$$

The correct answer is: Binary: 11110100    Decimal: 244

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

Select one:

- ☒ a. Binary: 11110100    Decimal: 244
- ☐ b. Don't know/No answer
- ☐ c. Binary: 11100100    Decimal: 244
- ☐ d. Binary: 11110100    Decimal: 240
- ☐ e. Binary: 11110010    Decimal: 244



Your answer is correct.

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

$$F \times 16^1 + 4 \times 16^0$$
$$15 \times 16 + 4 \times 1$$
$$240 + 4$$
$$244_{10}$$

The correct answer is: Binary: 11110100    Decimal: 244

Question 3

Correct

Mark 1.00 out of 1.00

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



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

Binary	0101	1101
Hexadecimal	5	D

The correct answer is: 5D

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



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 **5**

Incorrect

Mark -0.10 out of 1.00

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

Select one:

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

✖ This is wrong

We represent the values in the range 0 through 255 with an unsigned 8-bit byte.

The correct answer is: 0 ... 255



Mark 1.00 out of 1.00

Which of the following numbers is the binary number representing 15 in the decimal system (select one answer)?

- ☐ a. 0 0 0 0 0 0 0 0
- ☐ b. 0 0 0 1 1 1 1 1
- ☒ c. 0 0 0 0 1 1 1 1
- ☐ d. 1 1 0 0 1 1 1 1
- ☐ e. None of the rest of the choices

✓ Correct.

Your answer is correct.

The correct answer is:

0 0 0 0 1 1 1 1

Question **7**

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. Don't know/no answer
- ☐ c. -127 ... 127
- ☐ d. -128 ... 128
- ☐ e. 0...7
- ☒ f. -128 ...127



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



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):

$A1_{\text{hex}} - 92_{\text{hex}}$

- ☐ a. 0001 1111
- ☐ b. 0111 1011
- ☒ c. 0000 1111
- ☐ d. 0000 0111
- ☐ e. 0110 1100

✓ This is the correct answer.

Your answer is correct.

The binary form of  $A1_{\text{hex}}$  is: 1010 0001

The binary form of  $92_{\text{hex}}$  is: 1001 0010

Subtracting  $92_{\text{hex}}$  from  $A1_{\text{hex}}$  can be carried out by adding the 2's complement of  $92_{\text{hex}}$  to  $A1_{\text{hex}}$ .

To find the complement of  $92_{\text{hex}}$  we first flip the bits of its binary representation. This gives us: 0110 1101 (flip bits)

And then we add 1, so we get:

0110 1101

+ 1

This gives us:

0110 1110 (i.e., the 2's complement of  $92_{\text{hex}}$ )

Then we perform the addition:

1010 0001  $A1_{\text{hex}}$

0110 1110 (addition of 2's complement of  $92_{\text{hex}}$ )

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

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