Answer of CS500_midterm

Question1: Calculate the following arithmetic operations: (5 points)

a) 10011.11 – 11111.011 (Direct Subtraction)

Ans.

- 11111.011
  10011.110

- 01011.101

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b) 10011.11 – 11111.011 (1's complement)

Ans.

10011.110
+00000.100 ← 1's complement

10100.010 >> (The result = - 1's complement of (10100.010) = - (01011.101)

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c) (-20) – (+18) (Signed 2's complement in 6 bits)

Ans.

The range of 2's complement in 6 bits is $[- 2^{n-1} , + 2^{n-1}-1] = [- 32 , + 31]$

(-20) = - (010100) in 6 bits >> inside the range
(-18) = - (010010) in 6 bits >> inside the range

- (010100) >> 101100 ← 2's complement
- (010010) >> 101110 ← 2's complement

  1011010 >>

(The result = 38 that is out of range and that is "Overflow Problem)

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d) 7454 – 2935 (9's complement)

Ans.

7454
+7064 ← 9's complement

14518
↳1

4519

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e) 3245 – 9650 (10's complement)

Ans.

3245
+ 0350

3595 >> (The result = - 10's complement of (3595) = (- 6405)

Question2: (4 points)

a) **What is the equivalent octal $(?)_8$ and the equivalent Hexadecimal $(?)_{16}$ of The binary number $(111101010.11)_2$?**

Ans.

$(111101010.11)_2 = (752.6)_8 = (1EA.C)_{16}$

b) **Obtain the decimal value of the binary number $(10011.01)_2$ in case of signed-2's complement notation.**

Ans.

The decimal value of the binary number (10011.01) =
- 2's complement of (10011.01) = - (01100.11) = - $(12.75)_{10}$

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Quesion3: (6 points)

Assuming a binary pattern of length 14 bits with (9 bits for the fraction part and 5 bits for the exponent part), use the Excess systems to find the following:

a) What is the corresponding decimal value of the binary pattern 11001111010100 ?
b) Show how the decimal value $(- 21.25)_{10}$ is represented as binary patterns.

Ans.

a) The corresponding decimal value of the binary pattern 1 10011 11010100

1sf	5 bits for e	8 bits for f
1	10011	11010100

f = - 0.11010100

e = $(10011)_2$ → $(?)_{10}$ >> By using Excess notation method in 5 bits

= 10011 – 16 = 19 -16 = 3

Notation
$= 2^{n-1}$
$= 2^{5-1}$
= 16

$$f \times 2^e$$

$$- 0.11010100 \text{ X } 2^{+3}$$

$$- (110.10100)_2$$

$$= (- 6.625)_{10}$$

→The corresponding decimal value of the binary pattern (1 10011 11010100) is $(- 6.625)_{10}$

b) Show how the decimal value $(- 21.25)_{10}$ is represented as binary patterns.

$$- 21.25$$

$$- 10101.01$$

$$f \times 2^{e}$$

$$- 0.1010101 \text{ X } 2^{+5}$$

$f = - 0.1010101$

$e = (+ 5)_{10} >> (?)_2$ in Excess 16

$= + 5 + 16 = + 21 = 10101$

1sf	5 bits for e	8 bits for f
1	10101	10101010

The binary pattern of the decimal value $(- 21.25)_{10}$ = (11010110101010)

Quesion4: (5 points)

Explain briefly the following terminology (Show advantages and disadvantage):

1. RAM (The answer is in Lecture6 >> slide 27,28,29)
2. Cloud Computing (The answer is in Lecture7 >> slide 32)
3. Blu-ray discs (The answer is in Lecture7 >> slide 31)
4. Solid State Drives (The answer is in Lecture7 >> slide 28)
5. GPU(Graphical Processing Unit) (The answer is in Lecture6 >> slide 23)

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Quesion5: (5 points)

1. Data is a stream of _____representing events occurring in organization.
a. raw fact
b. meaningful information
c. information
d. numbers

2. Once a computer has been turned on, where does the CPU get the first instruction to execute?
a. RAM
b. Hard disk
c. Register
d. BIOS

3. An example of an **output device** is
a. The keyboard.
b. The mouse.
c. The power cord.
d. The monitor.

4. RAM is sometimes referred to as:
a. primary storage
b. ratio active memory
c. read-only memory
d. secondary storage

5.USB drives are also known as:
a. flash drives
b. optical drives
c. ports
d. universal state bus

6. What is the minimum number that can be represented by using 16 bits 2's complement?

Ans.

$[- (2^{n-1}) , + (2^{n-1}-1)] = [- (2^{16-1}) , + (2^{16-1}-1)]$ where n=16

$= [- 32768 , +32767]$

The minimum number is (- 32768)