Computer Organization And Microprocessors

ENCS2380

By:
Mohammed Saada

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Extra Questions

Q.1 : use 8-bit floating-point number representation as shown in the following Figure to represent $(-3.75)_{10}$

1 bit sign bit	3 bits exponent	4 bits significand

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Given the following segment of a byte-addressable memory [i.e. one cell is one byte] in a little-endian machine [i.e. least significant byte at the lowest address]:

Address	Memory Content [Hex]
20	00
21	80
22	DD
23	C1
24	00
...	...

Answer the following questions:

What is the decimal value of the 8-bit number at address 22 if we consider it as an unsigned integer?

=_____ (decimal)

What is the decimal value of the 8-bit number at address 23 if we consider it as 2's complement signed integer?

= _____ (decimal)

What is the decimal value of the 16-bit number at address 20 if we consider it as sign-magnitude integer?

= _____ (decimal)

What is the decimal value of the 8-bit number at address 23 if we consider it is an 8-bit floating-point number with the following representation:

Sign: 1 bit	Exponent: 3 bits	Significant: 4 bits

What is the decimal value of the 32-bit number at address 20, if we consider it as standard IEEE 32-bit floating-point number

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Q.2 :

A 16-bit memory location contains $(FFE0)_{16}$. Find the value of this if it represents:

1) Two's complement signed integer [2pts]

2) Sign magnitude signed integer [2pts]

3) Un-signed integer [2pts]

4) 16-bit floating-point number represented as follow: [4pts]

1 bit Sign bit	6 bits exponent	9 bits significant

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Q3 : Use Booth's algorithm to find the result of multiplying (8) by (-5). Clearly show all steps and verify your final answer.

A	Q	Q_{-1}	M	Comments

Q.4 : How many addition and how many subtraction operations are needed when using Booth's algorithm to multiply a number X by the multiplier "0011011100"

Number of Addition Operations : ____

Number of Subtraction Operations : ____

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Q.5: A given ARM chip has the following address assignments. Calculate the space and the amount of memory given to each section.

(a) Address range of 0x00100000 – 0x00100FFF for EEPROM

(b) Address range of 0x40000000 – 0x40007FFF for SRAM

(c) Address range of 0x00000000 – 0x0007FFFF for Flash

(d) Address range of 0xFFFC0000 – 0xFFFFFFFF for peripherals

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Q.6 : Find the address space range of each of the following memory of an ARM chip:

(a) 2 KB of EEPROM starting at address 0x80000000

(b) 16 KB of SRAM starting at address 0x90000000

(c) 64 KB of Flash ROM starting at address 0xF0000000

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Give the value of R2 [in Hex] after the following code is executed:

```
LDR R1,=0xAAAAAAAA
MVN R0,#0
EOR R2,R1,R0
```

R2=0x 10101010101010 ✖ (write numbers only)

The correct answer is: 55555555

Assuming ZF = 0 (Z flag), what are the values of R0 and ZF after executing the following instructions:

```
LDR R0,=0x4321
EORS R0, R0, R0
```

R0=0x_____ (number in Hex)

0000 ✔

The correct answer is: 0

ZF = _____

1 ✔

The correct answer is: 1

Give the value of R2 [in Hex] after the following code is executed:

```
MOV R0,#0xF0
MOV R1,#0x89
BIC R2,R1,R0
```

Answer: 09 ✔

The correct answer is: 9

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6. If C = 1, R2 = 0x95, and R3 = 0x4F prior to the execution of "SBC R2,R2,R3", what will be the contents of R2 after the subtraction? 0x46

7. In unsigned multiplication of "MUL R2,R3,R4", the product will be placed in register ___R2___ .

8. In unsigned multiplication of "MUL R1,R2,R4", the R2 can be maximum of ___1___ if R4 = 0xFFFFFFFF.

4. Give the value in R2 after the following code is executed:

```
MOV    R0,#0xF0
MOV    R1,#0x55
BIC    R2,R1,R0
```

5. Give the value in R2 after the following code is executed:

```
LDR    R1,=0x55555555
MVN    R0,#0
EOR    R2,R1,R0
```

14. Using MOV instruction, show how you rotate left the fixed value of 0x33 total of a) 4, b) 8, and c) 12 times. Also give the value in the register after the rotation.

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15. Write a program to convert 0x76 from packed BCD number to ASCII. Place the ASCII codes into R1 and R2.

16. For 3 and 2 the keyboard gives 0x33 and 0x32, respectively. Write a program to convert 0x33 and 0x32 to packed BCD and store the result in R2.

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Example 4-8

Write a program to toggle all the bits of address 0x40000000 by sending to it the values 0x55 and 0xAA continuously. Put a time delay between each issuing of data to address location.

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Example 4-5

Assume address location 0x200000 is assigned to an input port address and connected to 8 DIP switches. Write a simple short program to check the PORT and whenever both pins 4 or 6 are LOW, R4 register is incremented.

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