Problem 1: Number Systems [15 points]

a) Convert **-53.253** from decimal number into single-precision floating point number:

Write your final answer here:

11000100 10101010000001100010010

Show the details of calculations here:

53= 110101

0.253=010000001100010010

53.253=110101.
010000001100010010=1.10101010000001100010010 * 2^5

5+127=132=10000100
Sign=1

b) Convert **-55** from decimal numbers into signed binary words.

Write your final answer here:

1111111111001001

c) Convert **+55** from decimal numbers into signed binary words.

Write your final answer here:

0000000000110111

Show the details of calculations here:

55= 0000000000110111

2's 1111111111001001

Problem 2: Number Systems (continued) **[15 points]**

a) Convert **DC.BA** from hexadecimal number into binary-coded hexadecimal code (BCH)

Your answer here:

1101 1100 . 1011 1010

b) Show the signed 2's complement representation of **-34H**.

Your answer here:

34H
0011 0100

-34
2's 11001100

c) Convert **10110.01** from binary to decimal.

Your answer here:

22.25

$16+4+2+2^{-2}$

Problem 3: Arithmetic [20 points]

a) Assuming an 8-bit architecture (8080), show the result of the operation and the contents of the O,C,Z and S flags for: **95H**
x 2H

Your answer here:

```
  10010101
        10
 ---------
1 00101010
```

O=1 Z=0
C=0 S=0

b) Assuming a 16-bit architecture (8086/88-286), show the result of the operation and contents of the O,C,Z and S flags for: **AF02H**
+ 8ECDH

Your answer here:

```
  1010111100000010
  1000111011001101
 -----------------
1 0011110111001111
```

O=1 Z=0
C=1 S=0

Problem 4: Short-Answer Questions: [30 Points]

a) Explain how the stack data are referenced.

SS:SP

b) What memory location is addressed by in the real mode 80286 register when **CS=1200H** and **IP=1400H**?

13400H

c) Protected mode memory addressing allows access to which area of the memory in the 80286 microprocessor?

All 16MB

d) If **DS=0008H** in a protected mode system, which entry, which table, and which requested privilege level are selected?

Entry: **1**

Table: **0 (global)**

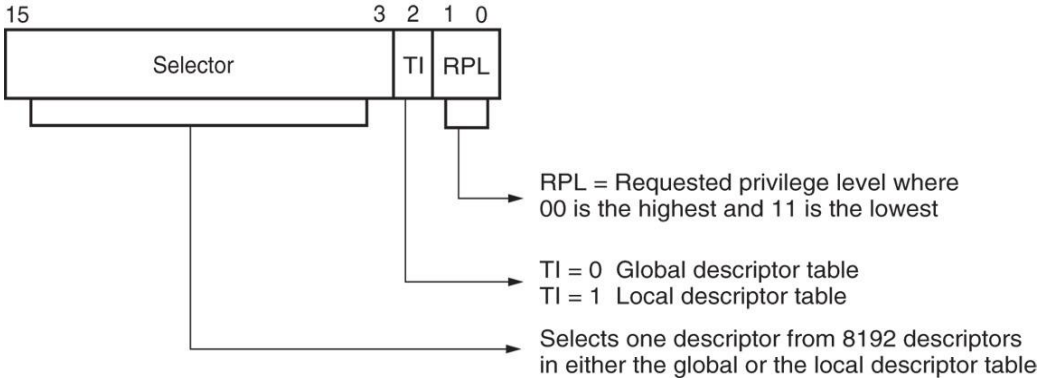
Requested privilege level: **00 (highest)**

e) What is the size of a memory page?

4KB

f) What is the purpose of the **TLB**?

Cache space to improve the performance of the paging mechansim



The content of a segment register during protected mode operation of the 80286-Core2 µp

Problem 5: Multiple Selection Questions: [20 points]

a) The first general-purpose programmable electronic computer system was known as:

A) Analytical Engine
B) ENIAC
C) UNIVAC
D) Colossus

Your answer here:

b) A floating point number is composed of:

A) sign
B) mantissa
C) exponent
D) All of the above

Your answer here:

c) A protected mode descriptor contains:

A) base, limit, and access rights
B) base and access rights byte
C) base and limit
D) none of the above

Your answer here:

d) Memory paging is accomplished through control registers:

A) CR2 and CR3
B) CR1 and CR2
C) CR1 and CR4
D) CR0 and CR3

Your answer here: