

---

<b>Due Date</b>	By 11:59pm Friday September 29, 2017
<b>Evaluation</b>	2% of final mark
<b>Late Submission:</b>	none accepted
<b>Purpose:</b>	The purpose of this assignment is to help you learn the overview of the computer architecture and digital logic concept.
<b>CEAB/CIPS Attributes:</b>	Design/Problem analysis/Communication Skills

(Please add your calculation as well and **NOT JUST FINAL ANSWER!**)

---

### **Question # 1**

- I. If you want to assemble a computer by yourself, what is the minimum hardware you need in which you cannot do it without them? (list them)
- II. Define the essential properties of the following concepts:
  - Von Neuman Model
  - Rock's Law
  - Moore's Law

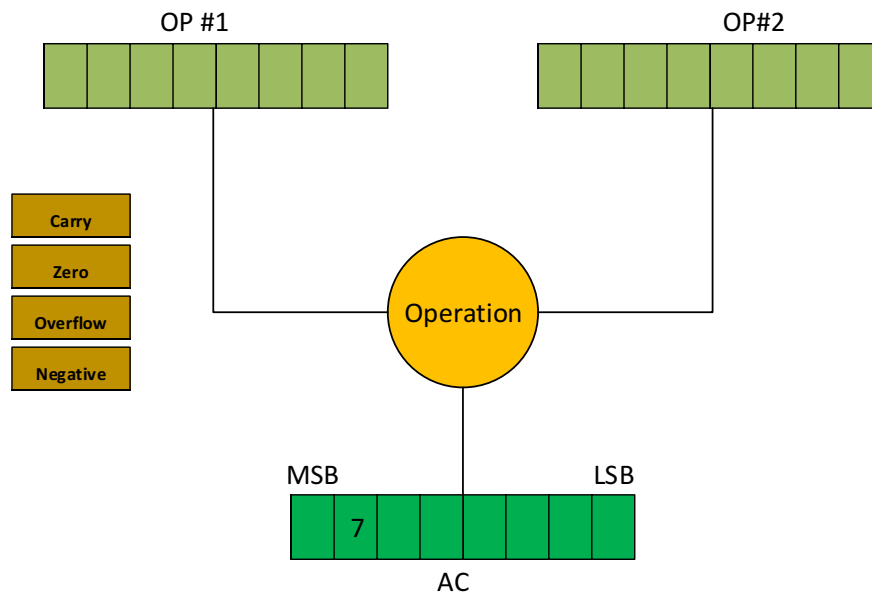
### **Question # 2**

Convert the following numbers from one base to another: (explain your method briefly)

- $(5454)_6 = ()_{10}$
- $(365.32)_8 = ()_2$
- $(010101010111.11101)_2 = ()_8$
- $(010101010111.11101)_2 = ()_{16}$
- $(\frac{1}{3})_{10} = ()_2$
- $(ABCE)_{16} = ()_8$

### Question # 3

We have designed the following competing system:



In this design, we have two registers (operand#1, operand#2) as an inputs and a register called AC to store the results. All of them are 8 bits. We also have four flags (1 bit registers). And their value are set based on the AC content.

$$Zero = \begin{cases} 1 & \text{the } AC = 0 \\ 0 & \text{Otherwise} \end{cases}$$

$$Negative = \begin{cases} 1 & \text{the } AC < 0 \\ 0 & \text{Otherwise} \end{cases}$$

$$Overflow = \begin{cases} 1 & \text{we have the overflow} \\ 0 & \text{Otherwise} \end{cases}$$

$$carry = \begin{cases} 1 & \text{there is a carry from } 7^{th} \text{ bit to MSB} \\ 0 & \text{Otherwise} \end{cases}$$

Based on that information, please perform the following calculation and fill the table. The numbers are in 2's complement system.

- $(2D-25)_{16}$
- $(33-45)_{16}$
- $(CA + 9c)$
- $(6E + 28)$

OP#1	OP#2	Result	Z	O	N	C	Is this result Valid?
2D	25						
33	45						
CA	9C						
6E	28						

**Question # 4**

I. Express the following numbers in the 14-bit simple floating point model:

- a.  $(33.86)_{10}$
- b.  $(-81.33333333)_{10}$
- c.  $(0.00001)_{10}$

II. Perform the following operation on the 14-bit simple floating point model:

- a.  $(-1.3431 + 0.003)_{10}$
- b.  $(19.25 * 0.00023)_{10}$
- c.  $(-12.15 * 2.10023)_{10}$

**Question # 5**

The 8-bit data with binary values are to be encoded using an even-parity Hamming code. What are the binary value after encoding?

- a. 10101111
- b. 10110001

**Question #6 (optional)**

Write a program in C/Java to calculate even parity hamming code for any given input.