Name: KEY **Id#**

ICS 233, Term 141

Computer Architecture & Assembly Language

Quiz# 1

Date: Tuesday, Sep. 14, 2014

Q1. Fill the blanks in the following questions:

1. There is a one-to-one correspondence between **assembly language** and **machine language**.

2. Two main advantages of programming in high-level language are: **program development is faster** and **programs are portable,**

3. Two main advantages of programming in assembly language are: **space and time efficiency** and **accessibility to system hardware.**

4. Given an address bus of 32 bits and a data bus of 64 bits, the maximum memory size that can be interfaced with the CPU is **2^{32}=4 G**bytes and the maximum number of bytes that can be read in a single read/write cycle is **64/8=8** bytes.

5. **Dynamic** RAM is slower than **static** RAM but is denser and cheaper.

6. The need for a memory hierarchy is due to **widening speed gap between CPU and main memory and also due to performance/cost tradeoff.**

7. **The instruction Pointer (IP)** is a register that holds the address of the next instruction to be fetched from memory.

8. **The instruction set architecture (ISA)** is considered as an interface between software and hardware and consists of **the instruction set**, **programmer accessible registers** and **memory**.

9. **Compiler** is program that translates high-level languages to assembly language.

10. Given a magnetic disk with the following properties:

    - Rotation speed = 8000 RPM (rotations per minute)
    - Average seek = 7 ms, Sector = 1024 bytes, Track = 250 sectors

    The average time to access a block of 200 consecutive sectors is **16.75** ms.

    Average access time = Seek Time + Rotation Latency + Transfer Time
    Rotations per second = 8000/60 =133.33 RPS
    Rotation time in milliseconds = 1000/133.33 = 7.5 ms
    Rotation Latency = 7.5/2 = 3.75 ms
    Time to transfer 200 sectors = (200/250)* 7.5 = 6 ms
    Average access time = 7 + 3.75 + 6 = 16.75 ms.

11. Assuming **8-bit 2`s complement** representation, the smallest (negative) number is **10000000** in binary and **-128** in decimal and the largest (positive) number is **01111111** in binary and **+127** in decimal**.**

12. Assuming **8-bit 2`s complement** representation, the binary number 11011100 represents the decimal number **-36**.

    2's complement of 11011100 = 00100100 = +36

13. Assuming **8-bit 2`s complement** representation, the number F0 represents the decimal number **-16**.

    2's complement of F0= 10 = +16

14. The binary number 11100101 represents character **e**, and uses an **odd** parity bit. Note that the ASCII code of character **A** is 41H and that of character **a** is 61H.

    Character is 110 0101 = 65H = 'e'