**Computer Architecture**

**Homework 1**

Theme: Prerequisites

All questions carry equal weight. Show your work to receive credit.

1. What are the decimal and hexadecimal representations of the maximum and minimum numbers. which can be represented by 16-bits in 2’s complement and unsigned representation?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Max, Dec | Max, Hex | Min, Dec | Min, Hex |
| 2's complement | 32767 | 0x7fff | -32768 | 0x8000 |
| Unsigned | 65535 | ffff | 0 | 0x0000 |

1. Convert the following numbers from the given base to the other three bases listed in the table (for octal conversion assume numbers are unsigned, otherwise assume they are signed 2’s complement):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Decimal | **369** | 189 | 214 | -3129 |
| Binary | 101110001 | **1011 1101** | 11010110 | 1111001111000111 |
| Octal | 561 | 275 | **326** | 171707 |
| Hex | 0x171 | BD | D6 | **F3C7** |

1. Give the BCD and ASCII representation of the number 36810 . Express your answer in hexadecimal.

BCD: 0x182

ASCII: Â

1. In Fig 1.6 what do the words MAR, MBR, IBR stand for?

Memory Address Register, Memory Buffer Register, Instruction Buffer Register

1. What is a stored program computer? Explain Moore’s Law.

One which stores program instructions in electronic memory.

Moore’s Law is the observation that, over the history of computing hardware, the number of transistors in a dense integrated circuit has doubled approximately every two years.

1. Discuss the differences between an embedded computer system and a general-purpose computer.

Embedded computer systems are built for one specific application, usually for specific commercial use, whereas general-purpose computers are focused around consumers and their tasks.

1. What do you understand by Cloud computing?

It is the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.

1. List and explain the main structural components of a computer and processor.

• CPU (Central processing unit): known as the processor, it’s the main computer component, responsible for the main functions of the computer. ALU(Arithmetic Logic Unit)

• I/O devices: responsible for the communication between the computer and the external world.

• Main memory: Stores data for the processor (RAM, or Random Access Memory)

• Data storage: device responsible for data saving. (Hard drives)

• System bus: responsible for the interconnection between data storage, CPU and I/O