**Tutorial 5:** WRES1201 – Computer System Architecture

1. What are the key properties of semiconductor memory?

They exhibit two stable (or semistable) states, which can be used to represent binary 1 and 0; they are capable of being written into (at least once), to set the state; they are capable of being read to sense the state.

1. Explain why one type of RAM is considered to be analog and the other digital.

A **DRAM cell** is essentially an analog device using a capacitor; the capacitor can store any charge value within a range; a threshold value determines whether the charge is interpreted as 1 or 0.

A **SRAM cell** is a digital device*,* in which binary values are stored using traditional flip-flop logic-gate configurations.

1. What are some applications for ROM (in scope of internal memory)?

Library subroutines for frequently wanted functions;

system programs;

function tables

1. What are the differences among EPROM, EEPROM and flash memory?

**EPROM**

* is read and written electrically;
* before a write operation, all the storage cells must be erased to the same initial state by exposure of the packaged chip to ultraviolet radiation.

**EEPROM**

* is a read-mostly memory that can be written into at any time without erasing prior contents;
* only the byte or bytes addressed are updated.

**Flash memory**

* is intermediate between EPROM and EEPROM in both cost and functionality.
* Like EEPROM, flash memory uses an electrical erasing technology. An entire flash memory can be erased in one or a few seconds, which is much faster than EPROM.
* In addition, it is possible to erase just blocks of memory rather than an entire chip.
* However, flash memory does not provide byte-level erasure.

1. List the main differences between SRAM and DRAM.

* DRAM require refreshing circuit.
* DRAM circuit is simpler, less expensive and smaller than SRAM.
* SRAM has faster access time than DRAM.
* SRAM used for cache memory and DRAM is used for main memory.

1. Why do DRAMs generally have much larger capacities than SRAMs constructed in the same fabrication technology?

because DRAM only use a transistor and a capacitor but SRAM require six transistor

1. Describe the task of ‘S’ in SDRAM.

exchanges data with the processor synchronized to an external clock signal and running at the full speed of the processor/memory bus without imposing wait states.

1. What are the two errors category in semiconductor memory system?

Hard failure (permanent physical defect) and soft error (like power supply or alpha particle)

1. Suppose an 8 bit data word stored in memory is 11000010. Using the Hamming algorithm, determine what check bits would be stored in memory with the data word. Show how you got your answer.

0 0 1 0