

Computer Architecture

Examination: Final-Term

Instructor: Muhammad Amin

Program: BS (CS)

Course Codes: CSC-208

EDP Codes: 102002092

Semester: Spring 2020

Total Marks: 50

Date: June 26, 2020

Timing: 12:00pm to 6:00pm

Note: Attempt all questions. Use examples and diagrams where necessary.

Q.1 Give answers to each of the following:

- a) Discuss the concept of word, addressable units, and unit of transfer for internal memories.
- b) How least recently used (LRU) and least frequently used (LFU) replacement algorithms are implemented for a cache memory with two-way set associative mapping?
- c) How read and write operations are performed in SRAM cell?
- d) Discuss 16-Mbit DRAM (4M x 4) organization in detail.
- e) What are the reasons for DVD's greater capacity over CD?

Q.2 Differentiate each of the following in detail:

- a) EEPROM and flash memory
- b) Hard failure and soft error in Semiconductor memories
- c) Read and write Mechanisms for magnetic disk
- d) Parallel access and independent access RAID schemes
- e) HD DVD and Blu-ray DVD

Q.3 Write note on each of the following:

- a) Memory access methods
- b) Principle of locality
- c) Possible approaches to cache coherency
- d) Practical Issues peculiar to SSDs
- e) CD read and write operation

Q.4 Solve each of the following:

- a) Suppose that the processor has access to two levels of memory. Level-1 contains 1000 words and has an access time of 0.01 μ s; level-2 contains 100,000 words and has an access time of 0.1 μ s. Assume that if a word to be accessed is in level 1, then the processor accesses it directly. If it is in level 2, then the word is first transferred to level 1 and then accessed by the processor. Suppose 95% of the memory accesses are found in level 1. Then find the average time to access a word. Also draw the general shape of the curve that covers this situation.
- b) Show the tag, Set, and word values for a two-way set-associative cache if the main memory address is 9F3A7Ch.
- c) Suppose an 8-bit data word (M) stored in memory is 10101010. Using the Hamming algorithm, determine what check bits (k) would be stored in memory with the data word.
- d) Consider a disk with an advertised average seek time of 6 ms, rotation speed of 7,200 rpm, and 512-byte sectors with 500 sectors per track. Suppose that we wish to read a file consisting of 2500 sectors for a total of 1.28 Mbytes. Estimate the total time for the transfer when:
 1. The file occupies all the sectors on 5 adjacent tracks
 2. The sectors are distributed randomly over the disk

******End of Assignment******