Program: BC (CS)

Subject: Computer Architecture

Major Assignment Final-Term

Course Code: CSC-208

EDP Code: 102007051

Semester: Summer 2020

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 μs; level-2 contains 100,000 words and has an access time of 0.1 μs. 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*********