0907432 Computer Design (Fall 2015)

Quiz 2

الاسم: رقم التسجيل: الرقم التسلسلي:

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Instructions: Time **20** minutes. Open book and notes exam. No electronics. Please answer all problems in the space provided and limit your answer to the space provided. **No questions are allowed**.

<Good Luck>

P1. Assume that you have a hard disk with the following specifications: 15,000 rpm, 4-ms average seek time, 8-ms maximum seek time, 0-ms controller overhead, and idle disk.

[4 marks]

A) What is the minimum time required to read one complete cylinder?

Min. read time = Time of one rotation to read an entire cylinder

= 60 / 15,000 = 1 / 250 = 4 ms

B) What is the maximum time required to read one complete cylinder?

Max. read time = Max seek time + one complete rotation latency + time of one rotation

= 8 + 4 + 4 = 16 ms

P2. Draw a direct mapped cache with the following specifications: size = 64 KB, block size = 16 bytes, word size = 4 bytes, address width = 32 bits, and write through scheme.

[6 marks]

Number of blocks = 64 KB / 16 bytes = 4 K blocks

<index> = lg_2 (No. of sets) = lg_2 (4 K) = 12 bits

<tag> = 32 - <index> - <block offset> = 32 – 12 – lg_2 (16) = 32 – 12 – 4 = 16 bits