

Quiz 1A

رقم الشعبة:

رقم التسجيل:

الاسم:

Instructions: Time 12 minutes. Closed books and notes. No calculators. Please answer all problems in the space provided. **No questions are allowed.**

<Good Luck>

Q. Why processor manufacturers have recently shifted to building multicore processors instead of building larger and faster uni-processors?

Building faster processors have hit the power wall, processors running on higher frequencies dissipate too much power.

Building larger processors have hit the ILP wall, diminishing returns on larger hardware for more ILP.

Q. Calculate FIT and MTTF for a system that has 3 disks (1M hour MTTF per disk), 2 CPUs (2M hour MTTF per CPU), and 3 memory modules (0.5M hour MTTF per module).

$$\begin{aligned} \text{Failure rate} &= (3 / 1,000,000 + 2 / 2,000,000 + 3 / 500,000) * 10^9 \\ &= 10 * 10^3 \text{ FIT} \end{aligned}$$

$$\begin{aligned} \text{MTTF} &= 10^9 / 10^4 \\ &= 100,000 \text{ hours} \end{aligned}$$

Q. Using pipeline diagrams, find how many cycles are needed to execute the following code sequence. Assume full forwarding paths are used plus stalls (when needed), and branch instructions are resolved in the Decode stage with predict not taken.

```
lw    r1, 0(r2)    F D E M W
lw    r3, 4(r2)    F D E M W
add   r1, r1, r3   F D D E M W
sw    r1, 8(r2)    F F D E M W
```

9 Cycles.