الاسم: رقم التسجيل: رقم الشعبة الأصلية:

==

Instructions: Time **15** 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.

P1. A multicore processor has a clock rate of 3.0 GHz and voltage of 1.0 V. When it is idle, it draws 30 A of static current. Assuming that, it consumes an additional average 50 W of dynamic power when all its six cores are active, what is the average current drawn by this processor when the six cores are active?

Dynamic current   **= Dynamic power ÷ Voltage**
                           = 50 ÷ 1 = 50 A

Total current   **= 30 + 50 = 80 A**

P2. Assume that the 5-stage pipelined processor studied in the class resolves branch instructions in the decode stage and solves data hazards through forwarding and stalls. However, this processor does not have all forwarding paths needed. It has only the forwarding paths from the memory and write-back stages to the execution stage. Use the pipeline diagram below to show how this processor executes the instruction sequence shown. Use arrows to show the forwarding actions needed.

Instruction	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
add x1,x2,x3	F	D	E	M	W										
sub x4,x1,x5		F	D	E	M	W									
ld x1,0(x4)			F	D	E	M	W								
add x5,x1,x7				F	D	D	E	M	W						
blt x5,x8,Label					F	F	D	D	D	E	M	W			