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Quiz Test 02

Course Code: CIS131 **Course Title: Computer Architecture and Organization**

Exam Duration: **40 mins** Marks: **15**

Answer ALL Questions:

1.	Encode the following **MIPS** instructions into their **32-bit** machine code: a) sub $t2, $s3, $s4 b) lw $t5, 7($s3) Use the following register numbers and opcodes: **$t2 = $10; $t5 = $13; $s3 = $19; $s4 = $20; sub opcode = 100010; lw opcode = 100011**	4
2.	What are the differences between RISC and CISC architectures?	3
3.	Mention one use case of Indexed Addressing Mode.	1
4.	A web application spends part of its execution time processing image compression. A new hardware accelerator makes the compression task run **8** times faster, while the rest of the application remains unchanged. If compression accounts for **55%** of the total execution time, find the overall system speedup.	3
5.	Consider two programs C and D that solve a given problem. C is scheduled to run on a processor Q1 operating at **1.2 GHz** and D is scheduled to run on processor Q2 running at **1.6 GHz**. C has a total of **8000** instructions, out of which **15%** are branch instructions, **45%** are load/store instructions, and the rest are ALU instructions. D is composed of **20%** branch instructions. The number of ALU instructions in D is **35%,** and the rest are load/store instructions. Total instruction count of D is **9500**. In both Q1 and Q2, branch instructions have an average CPI of **4** and ALU instructions have an average CPI of **2**. Both architectures differ in the CPI of load/store instructions. They are **3** and **2** for Q1 and Q2, respectively. a) Find CCT for each processor. b) Calculate the average CPI for both. c) Calculate the execution time for both. d) Determine which processor is faster and by what speedup factor.	4