

JK LAKSHMIPAT UNIVERSITY JAIPUR
INSTITUTE OF ENGINEERING AND TECHNOLOGY
End-Term Examination

Programme: B.Tech (ECE)
 Course Name: Processor Architecture
 Maximum Marks: 30

Year/Semester: 2023/ backlog
 Course Code: EE1408 -
 Time Allowed: 2:30 Hours

- All questions are compulsory.
- The student, before starting to write the solutions, should please check the question paper for any discrepancy and ensure that they have been delivered the question paper of right course code.

Sr. No.		Question	Marks																																		
1.		You are asked to evaluate performances of two desktop computers on five different types of instructions. Computer A has a clock rate of 3.0GHz, while computer B has a clock rate of 2.7GHz. You are provided by the following measurements: <table><tr><th rowspan="2">Instruction Type</th><th colspan="2">Computer A</th><th colspan="2">Computer B</th></tr><tr><th>CPI</th><th>Instruction Count</th><th>CPI</th><th>Instruction Count</th></tr><tr><td>1</td><td>1</td><td>$6 * 10^9$</td><td>2</td><td>$8 * 10^9$</td></tr><tr><td>2</td><td>4</td><td>$12 * 10^9$</td><td>1</td><td>$10 * 10^9$</td></tr><tr><td>3</td><td>2</td><td>$14 * 10^9$</td><td>4</td><td>$13 * 10^9$</td></tr><tr><td>4</td><td>5</td><td>$9 * 10^9$</td><td>3</td><td>$14 * 10^9$</td></tr><tr><td>5</td><td>2</td><td>$15 * 10^9$</td><td>4</td><td>$18 * 10^9$</td></tr></table> a) Evaluate computer A and B based on the average CPI. b) Which computer is faster on the total execution time? c) If you want to run some benchmarks that contain an instruction mix of 50% of type II, 30% of type IV, and 20% of type V, which computer is better according to the execution time?	Instruction Type	Computer A		Computer B		CPI	Instruction Count	CPI	Instruction Count	1	1	$6 * 10^9$	2	$8 * 10^9$	2	4	$12 * 10^9$	1	$10 * 10^9$	3	2	$14 * 10^9$	4	$13 * 10^9$	4	5	$9 * 10^9$	3	$14 * 10^9$	5	2	$15 * 10^9$	4	$18 * 10^9$	2+2+2
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2		Define (i) superscalar and (ii) super-pipeline concepts. Derive the equation for ideal speedup for a superscalar super-pipelined processor compared to a sequential processor. Assume N instructions, k-stage scalar base pipeline, superscalar degree of m, and super pipeline degree of n.	2+2+2																																		
3	a	What is virtual memory? Explain the need for virtual memory.	1.5																																		
	b	What are the main differences between a multi-processor system and a multi-computer system?	1.5																																		
	c	In a shared memory system, explain two schemes to maintain cache-coherence.	1.5																																		
	d	Name two RISC and two CISC processors. What are the main characteristics of RISC processors?	1.5																																		
4.		Explain the used of vectored interrupts in processors. Why is priority handling desired in interrupts controllers? How do the different priority schemes work?	2+2+2																																		
5	a	What are the two main approaches to hardware multithreading?	2																																		
	b	Differentiate in-order execution from out-of-order execution?	2																																		
	c	Consider a cache with 64 blocks and a block size of 16 bytes. To what block number does byte address 1200 map?	2																																		