International Islamic University Chittagong

Department of Computer Science & Engineering

B. Sc. in CSE Semester Final Examination, Autumn 2024

Course Code: CSE 3521 Course Title: Computer Architecture

Total marks: **50** Time: **2.5 hours**

[Answer all the questions. Figures in the right hand margin indicate full marks. M:Marks, C:CLO, D: Domain]

		M	C	D
	Group-A			
1. a)	Compare the performance of single-cycle, multi-cycle, and pipeline processors in terms of CPI. Discuss with a detailed example.	5	5	1
	OR			
	Suppose you are given an instruction add $s1,$t3,$t4. Describe the complete operation of the datapath using the instruction with a figure.			
b)	Explain the structural differences between single and multi-cycle data path.	5	5	2
	OR			
	What temporary registers are used in multicycle datapath? What changes are required for the multiplexer in multicycle datapath?			
2. a)	Differentiate the single and multi-cycle data path on the basis of their control signal.	5	5	2
b)	A program has the following instruction mix: 30% ALU operations, 25% loads, 10% stores, 30% branches, and 5% jumps. If each instruction type has the following cycle counts: ALU - 1, Load - 2, Store - 2, Branch - 1, Jump - 1, calculate the overall CPI.	5	2	3
	Group-B			
3.a)	What is the role of control hazards in pipeline architecture? Propose a method to minimize control hazards.	5	5	2
b)	Design a diagram showing the working of a branch instruction in a pipelined data path and explain the steps involved.	5	5	2
4.a)	Define *miss penalty, cache miss, hit rate, tag* in caching, memory hierarchy	5	3	2
b)	What is DMA controller? Describe the configuration of DMA controller.	5	3	3
5. a)	What is TLB? Discuss the operation of paging and TLB using flow diagram?	5	3	2
b)	Explain the direct mapped cache system with figure.	5	4	3
	OR			
a)	Explain the role of virtual memory in modern computer systems. Describe the translation process of virtual addresses to physical addresses with the help of a diagram.	5	3	2
b)	What is RAID? Explain at least three of its type with example.	5	4	3