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Daffodil International University

Faculty of Science & Information Technology
Department of Software Engineering
Midterm Examination, Spring 2026
Course Code: SE222; Course Title: Computer Architecture
Sections & Teachers: 44A to 44K (AS, HKN, HT, AJE)

Time: 1 Hour 30 Mins **Marks: 25**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1. a) A 2 GHz processor was used to execute on a program with the following instruction mix and clock cycle counts: [Marks-5] CLO-1 *Level-2*

Instruction Type	Frequency	CPI
Integer ALU operation	10%	1
Floating point Operation	40%	7
Loads & Stores	30%	5
Branches	20%	3

Compute the effective CPI, MIPS rate and Execution Time for this program.

b) **Explain** Moore's Law and its significance for processor performance. Then, using the exponential growth model, **calculate** how many transistors a processor will have after 8 years if it initially contains 2 million transistors and the doubling time is 2 years. [Marks-4]

c) **Clarify** the fetch and execute instruction of GP processor along with diagram. [Marks-3]

d) Suppose that a task makes extensive use of floating-point operations, with 45% of the time is consumed by floating-point operations. With a new hardware design, the floating-point module is speedup by a factor of 12. **Compute** the speedup using Amdahl's Law. [Marks-3]

2. a) **Explain** the execution steps of Hypothetical Processor for the given scenario. [Marks-4] CLO-2 *Level-4*

Memory	
101	3606
102	6607
103	7608
104	4609
606	000A
607	0005
608	000C
609	0000

CPU Register	
101	PC
	AC
	IR

Here memory contents are represented in hexadecimal
0011---Load AC from Memory
0110---Subtract AC from Memory
0100---Store AC to Memory Location
0111---Multiply AC to memory

b) **Explain** the concept of an interrupt handler in a computer system. **Describe** the steps that occur from the moment an interrupt is generated until the CPU resumes the interrupted program. [Marks-3]

c) **Demonstrate** the cache read operational diagram of computer system. [Marks-3]