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Daffodil International University

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Midterm Examination, Fall 2023
Course Code: SE222; Course Title: Computer Architecture
Sections & Teachers: KBB, JNM

Time: 1:30 Hrs **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) Consider two different machines with two different instruction sets. Using two compilers, run a program with the following distribution of instructions.

[Marks-4] **CO-1 Level-3**

Instruction Type	Machine-A (Clock rate 250MHz)		Machine-B (Clock rate 300MHz)	
	Instruction Count in Millions	CPI	Instruction Count in Millions	CPI
ARITHMETIC	8	1	7	1
LOAD	6	5	8	4
BRANCH	2	4	2	5
STORE	4	2	3	3

Utilize the effective CPI, MIPS rate, and execution time for this program.

b) Consider the following information of CPU and Memory
Opcode with action:
0011→ load AC from memory
0100→ store AC to memory
0110→ Subtract to AC from memory
0111→ Multiply to AC from memory

[Marks-3]

Construct a Hypothetical Processor for the provided block.

Memory

101	3606
102	6607
103	7608
104	4609
.	
.	
606	0007
607	0005
608	0003
609	0008

CPU Register

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	c)	Assume that your processor is working with 6 I/O devices which are a keyboard, a portable disk, a pen drive, a headphone, a mouse, an audio system and a DVD - ROM with the priorities of 1, 2, 3, 4, 5, 6 and 7 in sequence. **Identify** multiple interrupt handling with proper diagram using the following cases. **Cases:** i. Processor first received a signal from pen drive at time t=13 unit ii. Then received another signal from the headphone at time t=14 unit iii. After that received the 3rd signal from the mouse at time t= 15 unit. iv. Next Processor received the 4th signal from the portable disk at time t= 16 unit. v. After processor received the 5th signal from the audio at time = 17 unit. vi. Next processor received the 6th signal from the keyboard at time = 19 unit vii. Finally, processor received the last signal from the DVD - ROM at time = 21 unit →NB: Each task is continuous and can only be finished after handling the interrupts according to their respective priorities.	**[Marks-5]**	
	d)	**Illustrate** the General-purpose processor with proper allocation units.	**[Marks-3]**	
2.	a)	**Build** the direct memory mapping (DMA) architecture using figure inspection.	**[Marks-4]**	**CO-2** ***Level-3***
	b)	**Identify** the cache memory structure and draw the Cache read operation flowchart with details operation and explanation.	**[Marks-4]**	
	c)	**Choose** the difference in between logical and physical cache address.	**[Marks-2]**	