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Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Spring 2024
Course Code: SE222 ; Course Title: Computer Architecture
Sections & Teachers: FBR, KBB, NJM, SS, SUP

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 400-MHz processor was used to execute a benchmark program with the following instruction mix and clock cycle counts. [Marks-5]

Instruction Type	CPI	Instruction Mix
Arithmetic and Logic	1	60%
Load/Store with cache hit	2	18%
Branch	4	12%
Memory reference with the cache miss	8	10%

Identify the effective CPI, MIPS rate from the table to execute program delivery.

b) 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. **Label** the multiple interrupt handling with proper diagrams using the following cases. [Marks-5]

CLO-1
Level-1

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 units.
iv. Next Processor received the 4th signal from the portable disk at time t= 16 units.
v. After the processor received the 5th signal from the audio at time = 17 units.
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.

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	c)	**Find** the Hypothetical Processor Instructions from the generated figure.	[Marks-5]	

Memory

400	13501
401	23502
402	63503
403	53503
404	43503
3501	005
3502	003
3503	002

Here,

0001 = Load AC from memory

0010 = Add to AC from memory

0100 = Multiply to AC from memory

0101 = Store AC to memory

0110 = Divide to AC from memory

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2.	a)	**Classify** and briefly **derive** the main structural components of a GP processor	[Marks-4]	CLO-2 *Level-3*
	b)	Demonstrate the logical and physical cache diagram with explanations.	[Marks-3]	
	c)	Show the diagram of a typical Cache Read Operation.	[Marks-3]	