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Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Mid term Examination, Fall 2025

Course Code: 317 , Course Title: Microprocessor and Microcontroller

Level: 3Term:1 Batch: 65

Time: 01:30 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)*	A systems architect is analyzing the evolution of Intel microprocessors. She compares an early 4-bit processor, used in calculators, against the 16-bit bus processor that powered the first IBM PC. The latter could access vastly more memory and used a high-speed buffer to pre-fetch instructions. Based on this scenario, identify the two processors and explain the key differences in their data bus width, memory addressing capability, and the architectural feature that enhanced the PC's processor performance.	[5]	CO1
2.	*a)*	In a data-processing system using the 8086 microprocessor, an array of records is stored across multiple 64 KB boundaries, requiring access to memory locations that extend beyond the Data Segment (DS) limit. Explain how the Bus Interface Unit (BIU) computes the 20-bit physical address for such data and analyze how the Extra Segment Register (ES) complements the Data Segment to enable this access. Illustrate your explanation with an example using the Based-Indexed Addressing Mode, showing how both segment and offset values combine to form the effective physical address	[5]	CO2
	b)	Analyze the process step by step how the 8086 coordinates with the DMA controller using the **HOLD** and **HLDA** pins	[5]	

3.	*a)*	A sensor-based system stores measurements in memory. The 8086 microprocessor needs to access these readings for processing. The memory map and register values are as follows:
		DS = 2500H, SS = 3000H
		BX = 1000H, SI = 0200H, DI = 0300H, BP = 0100H
		Measurements are stored at offsets using different addressing modes.
		The program contains these instructions:
		MOV AX, [BX+SI+10H]
		MOV AL, [DI+05H]
		MOV DX, [BP+08H]
		MOV CX, [SI]
		Identify the **addressing mode** for each instruction.
		Calculate the **effective address (EA)** for each memory reference
			[4]	CO3

	b)	i.A small shop keeps track of the quantity of an item sold each day in memory. The quantities for 5 days are stored at memory locations labeled DAY1 to DAY5. Write an 8086 assembly program to:	[3+3]	

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Calculate the **total quantity sold** over the 5 days.Store the total in memory at location TOTAL.If the total is **greater than 100**, set a flag in memory at location FLAG to 1; otherwise, set it to 0

ii.Trace the value of AL and [C] **after each instruction.**

```
.DATA
   A DB 8
   B DB 12
   C DB 0
DATA ENDS

.CODE
START:
   MOV AL, [A]
      CMP AL, 10
   JG GREATER
   ADD AL, [B]
      JMP SKIP
GREATER:
   SUB AL, [B]

SKIP:
   MOV [C], AL
   MOV AH, 4CH
   INT 21H
CODE ENDS
END START
```