

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION

SUMMER SEMESTER, 2023-2024

DURATION: 1 HOUR 30 MINUTES

FULL MARKS: 75

CSE 4621: Microprocessor and Interfacing

Programmable calculators are not allowed. Do not write anything on the question paper.

Answer all 3 (three) questions. Figures in the right margin indicate full marks of questions with corresponding COs and POs in parentheses.

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|-------|--|-------------------------|
| 1. a) | Differentiate between multicore and multiprocessing systems. | 4
(CO1)
(PO1) |
| b) | The physical address of an Intel 8086 memory location is 4A37BH. Compute the following instructions with necessary explanation:
i. The offset address if the segment number is 40FFH.
ii. The segment number if the offset address is 123BH. | 3 × 2
(CO2)
(PO1) |
| c) | Discuss the necessity of two separate registers for addressing in an Intel 8086 microprocessor. | 5
(CO1)
(PO1) |
| 2. a) | What do you mean by a 16-bit microprocessor? Outline the differences between a modern microprocessor and the classical Intel 8086 microprocessor. | 3 + 4
(CO1)
(PO1) |
| b) | Design the updated architectural diagram by making the following changes to the Intel 8086 internal architecture:
i. Remove the Arithmetic Logic Unit. The associated operations will be performed by a separate co-processor connected through an interface.
ii. Add two new general purpose registers similar to the existing ones.
iii. Address bus size is reduced from 20 bits to 16 bits. Remove the redundant registers. | 5 × 3
(CO3)
(PO2) |
| c) | On a system with identical configurations, the game Red Dead Redemption 2 was played on Microprocessor A and Microprocessor B, yielding frame rates of 160 fps and 150 fps respectively. Can it be concluded from the benchmark results that Microprocessor A is superior to Microprocessor B in terms of gaming performance? | 5
(CO3)
(PO2) |
| 3. | For the following questions, replace stdID2 and stdID4 with the last 2 and 4 digits of your student ID in hexadecimal respectively. For example - if your ID is 180041120, then stdID2 will be 20H and stdID4 will be 1120H. | |
| a) | Suppose CL = 00h and the instruction SUB CL, stdID2 is executed. Calculate the updated Overflow, Sign, Zero, Auxillary Carry, Parity, Carry flag register values with proper explanation. | 9
(CO2)
(PO1) |
| b) | Construct and explain the machine code for the following instructions:
i. MOV stdID4 [BX] [SI], AX
ii. MOV ES:stdID4 [BX], DH | 6 × 2
(CO2)
(PO1) |
| c) | Decode and explain the following machine code to the corresponding assembly language instructions:
i. 1011 1101 ; 1101 0011 ; 1011 0100
ii. 0011 1110 ; 1000 1011; 0111 0110; 1100 1011 | 6 × 2
(CO2)
(PO1) |

Appendix

Table 1: MOV Instruction Coding: REG Field

REG	W=0	W=1
000	AL	AX
001	CL	CX
010	DL	DX
011	BL	BX
100	AH	SP
101	CH	BP
110	DH	SI
111	BH	DI

Table 2: MOV Instruction Coding: MOD and R/M Field

RM/MOD	00	01	10	11	
				W=0	W=1
000	[BX] + [SI]	[BX] + [SI] + d8	[BX] + [SI] + d16	AL	AX
001	[BX] + [DI]	[BX] + [DI] + d8	[BX] + [DI] + d16	CL	CX
010	[BP] + [SI]	[BP] + [SI] + d8	[BP] + [SI] + d16	DL	DX
011	[BP] + [DI]	[BP] + [DI] + d8	[BP] + [DI] + d16	BL	BX
100	[SI]	[SI] + d8	[SI] + d16	AH	SP
101	[DI]	[DI] + d8	[DI] + d16	CH	BP
110	d16	[BP] + d8	[BP] + d16	DH	SI
111	[BX]	[BX] + d8	[BX] + d16	BH	DI

Table 3: OP Codes for Various Instructions

Instruction Name	Opcode
IN	1110010
MOV (Reg, Memory)	100010
MOV (Immediate)	1011
Segment Override Prefix	001xx110