MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

UNIVERSITY ORDINARY EXAMINATION

2023/2024 ACADEMIC YEAR

THIRD YEAR **SECOND** SEMESTER EXAMINATION FOR BACHELOR OF TECHNOLOGY IN ELECTRICAL AND ELECTRONICS ENGINEERING

EET 309 – MICROPROCESSORS ARCHITECTURE AND INTERFACING

DURATION: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

1. Answer question one and any other two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a. Differentiate between a microprocessor and a microcontroller. (2marks)
b. Describe the following:
    i. Editor
    ii. Assembler
    iii. Linker
    iv. Debugger
    v. Compiler (5marks)
c. A microprocessor based system comprises of three parts. Describe them. (3marks)
d. Pms Ado to AD10 for the 8086 microprocessor are used for addressing and data movement. However, addressing and data transfer operations cannot be performed in the same clock cycle. Explain. (4marks)
e. Calculate the physical address on the stack segment when its starting address is 5000 and the stock pointer is 3F69. (4marks)
f. List the components of the Executions unit. (3marks)
g. The opcode for more instruction between two registers and between a register and a memory location is 100010, generate the instruction code for:
    i. MOV CX, DX
    ii. MOV DS: {4287H + BP}, CX
    iii. MOV CL, {DI} (9marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

a. What is a bus? Describe the three types of buses in a microprocessor. (4marks)
b. What are the four pointers to the four stack segments? Describe them. (4marks)
c. The opcode for data transfer between a segment register and a register or a memory location is: 10001110. Generate the instruction code for:
    i. MOV DS, BX
    ii. MOV DS, [1234H + BX+ SI] (6marks)
d. Explain the following instructions:
    i. Push 1234[SI]
    ii. Pop 1234 (SI) (4marks)
e. Differentiate between high-level language and assembly language. (2marks)

QUESTION THREE (20 MARKS)

a. The CPU is divided into two independent functional parts: Describe them, and explain how they are able to achieve pipelining. (4marks)
b. In what situations will the following conditional flags be set:
   i. Carry flag
   ii. Zero flag
   iii. Sign flag
   iv. Parity flag (4marks)
c. The opcode for the instruction of adding contents of two registers or a register and memory location is 000011. Generate the instruction for the following instruction. Add CX, AX and show the status of the following conditional flags: zero, sign, panty, farry and overflow flags.
d. Perform Decimal Adjustment after Addiction (AAA) for the following addition: 36_{10} + 57_{10} (4marks)
e. Add the following numbers: FA63H + 3B41H (3marks)

QUESTION FOUR (20 MARKS)

a. 8086 has addressing modes that can be classified into five groups list them. (3marks)
b. With the help of a diagram, show the various steps involved in executing assembly language programs and programs written on high level languages respectively. (4marks)
c. For the instruction Movs BYTE. If [DF] = 0, [DS] = 30000, [SC] = 0600, [ES] = 5000 [DI] =0200, and the contents; [30600] = 56H and [40300] =78H. What will be the contents of [30600] and [40300] after the execution of the instruction? (4marks)
d. Get the after of the following instruction: MUL 1234 [BX] [SI] > DX, AX (5marks)

	Before	After
DS[BX = SI + 1234]	0030	?
AX	9180	?
DX	2345	?

e. Get the after of the following instruction: (4marks)
SUB. AX, BX

	Before	After
AX	3F36	
BX	40F7	