ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION **WINTER SEMESTER, 2019-2020**

DURATION: 1 Hour 30 Minutes **FULL MARKS: 75**

CSE 4503: Microprocessors and Assembly Language

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

There are **4 (four)** questions. Answer any **3 (three)** of them.

Figures in the right margin indicate marks.

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1. a) Derive the contents of the `Flag` (`CF, PF, ZF, SF, AF`) register of `8086` microprocessor upon executing the following instructions: 10

   i. `CMP AL, ABh` ; Assume `AL` initially contains `ABh`.
   ii. `ADD AX, 8000h` ; Assume `AX` initially contains `8000h`.

   b) Write appropriate assembly language codes for 8086 to accomplish the following tasks: 8

   i. 0Fh × (225 - 200) + 127
   ii. 0FFFh × 10h + 10101010b

   c) What is an assembler? Using an appropriate example, briefly explain the concept for fetching of an instruction/data from the memory. 2+5

2. a) Considering following memory addresses and instructions, mention the output (i.e., values) of register A, B and Stack Pointer (SP) after execution of all the instructions. Assume, initially the stack is empty. 10

Memory Address	Assembly Language
0100h	**MVI** A, 250
0102h	**MVI** B, 10
0104h	**ADD** B
0106h	**PUSH** A
0108h	**POP** B

   b) Briefly explain about the stack operation of 8086 microprocessor. 8

   c) Write an assembly language code to take a single-character as an *input* and show the same character as an *output* with new line and carriage return. 7

3. a) Derive the machine codes of the following `MOV` instructions using its coding template and also show how the machine codes of the instructions are to be stored in memory: 10

   i. `MOV AL, 255`
   ii. `MOV SS:[SI], DH`

   b) How do `8085` and `8088` microprocessors differ with each other in terms of flag register? 8

   c) Write an assembly language program structure to allocate exactly 64 Kbytes of memory for *code segment and data segment*, and also 1024 Bytes for *stack segment*. 7

4. a) Write an assembly language program equivalent of *if-else* using conditional jump instructions for accessing following conditional levels L1, L2 and L3; where, take two values at AL and BL, respectively. 10

Condition	Operations for Levels
`If AL>BL`	`L1: Add AL with BL`
`If AL<BL`	`L2: Subtract BL from AL`
`If AL=BL`	`L3: X-or between AL and BL`

   b) Write short notes on Addressing Codes from memory 8

   c) Explain the procedure to perform `SUB` and `CMP` operation in assembly language. 7

B.Sc. Engg. / HD CSE 5th Semester — 05 March 2019 (Afternoon)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION — **WINTER SEMESTER, 2018-2019**

DURATION: 1 Hour 30 Minutes — **FULL MARKS: 75**

CSE 4503: Microprocessors and Assembly Language

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There are **4 (four)** questions. Answer any **3 (three)** of them.

Figures in the right margin indicate marks.

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1. a) Differentiate between Assembly language and Machine Language. How are these related? 10

   b) Derive the contents of the `Flag (CF, PF, ZF, SF)` register of `8086` microprocessor upon executing the following instructions: 8

   i. `AND AL, FFh` ; Assume `AL` initially contains `FFh`.

   ii. `SUB AX, 8000h` ; Assume `AX` initially contains `8000h`.

   c) Write appropriate assembly language codes to accomplish the following tasks: 7

   i. 0Fh × (225 - 200) + 127

   ii. 0FFFh × 10h + 10101010b

2. a) Considering following memory segments, offsets and instructions, write the sequence of PUSH/POP operations on stack segment mentioning different Stack Pointer (SP) values. Assume, initially the stack segment is empty. 10

Segment	Offset	Assembly Language
1000h	0100h	`IN AL, 27h`
1000h	0102h	`MOV DL, AL`
1000h	0104h	`MOV AH, 1`
1000h	0106h	**`INT 21h`**
1000h	0108h	`ADD AL, DL`

   b) How do `8085` and `8086` microprocessors differ with each other in terms of flag register? 8

   c) "*Number of address locations and memory size have a close relation with the Address Bus length*" – How? Explain with example. 7

3. a) Write a short note on the registers set of 8085 microprocessor. 10

   b) Briefly explain the concept of stack memory and pointer of 8085 and 8086 microprocessors. 8

   c) Write an assembly language program structure to allocate exactly 64 Kbytes of memory for *code segment*, 512 Bytes for *stack segment* and also consider that the size for *data segment* may exceed 64 Kbytes. 7

4. a) Write a short note on *polling* and *interrupt* concepts. Which one is preferable and why? 10

   b) Write short notes on: 8

   i. Implied Addressing

   ii. Even and Odd memory bank.

   c) Explain the procedure to perform `NOT` and `NEG` operation in assembly language. 7

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B.Sc. Engg. / HD CSE 5th Semester — 16 March 2018 (Afternoon)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION — **WINTER SEMESTER, 2017-2018**

DURATION: 1 Hour 30 Minutes — **FULL MARKS: 75**

CSE 4503: Microprocessors and Assembly Language

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There are **4 (four)** questions. Answer any **3 (three)** of them.

Figures in the right margin indicate marks.

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1. a) 'Assembly language is a low level language' - True/False? How do the `8085` and `8086` microprocessors differ with each other in terms of register sets? 9

   b) Derive the contents of the `Flag` (`CF, PF, ZF, SF`) register of `8086` microprocessor upon executing the following instructions: 8

      i. `CMP AL, ABh` ; Assume `AL` initially contains `FFh`.

      ii. `SUB AX, 1234h` ; Assume `AX` initially contains `8000h`.

   c) Write appropriate assembly language codes to accomplish the following tasks (use as many as possible arithmetic instructions with less number of registers): 8

      i. 0Bh × (200 - 225) + 127

      ii. FFFh × 10h + 1111b

2. a) What is Memory Segment? Write the concept of memory segmentation and addressing for 8086 processor. 9

   b) "*Number of address locations and memory size have a close relation with the Address Bus length*" – How? 8

   c) Suppose, while debugging an assembly language program the values of the registers are: `Flag=FEB9h, IP=0102h, CS=0500h, SP=FFFCh`. Now, if `INT 21h` is requested, derive the memory addresses from where the new `IP` and `CS` can be retrieved; Also show the new `SP` value and steps involved in handling the interrupt by the 8086 microprocessor. 8

3. a) Draw the schematic architecture of 8086 microprocessor. Write an example to explain the operation of *Instruction Pointer and Code Segment* register of 8086 microprocessor. 9

   b) Briefly explain the concept of Fetching and Execution cycles of an instruction. 8

   c) Write an assembly language program structure to allocate exactly 64 Kbytes of memory for *data segment*, 128 Bytes for *stack segment* and also consider that the size for *code segment* may exceed 64 Kbytes. 8

4. a) Write a short note on *interrupt* concepts and why it is so necessary? 9

   b) Explain the procedure to perform `MUL` and `DIV` operation in assembly language. 8

   c) To perform a `SWAP` operation amongst the contents of `CX` and `DX` registers, write two assembly language programs using: i. 8086 Stack Segment Operation ii. 8086 Instruction 8

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B.Sc. Engg. / HD CSE 5th Semester — 01 June 2018

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION — **WINTER SEMESTER, 2017-2018**

DURATION: 3 Hours — **FULL MARKS: 150**

CSE 4503: Microprocessors and Assembly Language

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

There are **8 (eight)** questions. Answer any **6 (six)** of them.

Figures in the right margin indicate marks.

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1. a) What do you mean by single and multi-core microprocessor systems? Briefly explain the importance of using assembly language in a microprocessor system. 10

   b) Derive the contents of the `Flag` (`CF, PF, ZF, OF`) register of `8086` microprocessor upon executing the following instructions: 8

   i. `CMP AL, FFh` ; Assume `AL` initially contains `FFh`.
   ii. `TEST AL, FFh` ; Assume `AL` initially contains FFh.

   c) Explain the purpose of `DUP` operator with an example. 7

2. a) Derive the contents of the following `MOV` instructions using its coding template and also show how the contents of the instructions can be stored in memory: 12

   i. `MOV AL, BL`
   ii. `MOV FFh[SI], BH`
   iii. `MOV DX, [ABCDh]`

   b) Write short differentiations between the following 8086 assembly language instructions: 8

   i. `ROR and SHR` ii. `LEA and OFFSET` iii. `NOT and NEG`

   c) Write an assembly language program structure to allocate exactly 64 Kbytes of memory for *data segment*, default memory bytes for *stack segment* and also consider that the size for *code segment* may exceed 64 Kbytes. 5

3. a) Draw the schematic architecture of 8088 microprocessor. Write short notes on *segment registers* of 8086 microprocessor. 9

   b) Write an assembly language program that takes N as a decimal digit (0 ~ 9) input and shows the summation of $1+2+ \ldots + N$ as output. 9

   c) Suppose, while debugging an assembly language program the values of the registers are: `Flag=FEB9h, IP=0102h, CS=0500h, SP=FFFCh`. Now, if `INT 21h` is requested, derive the memory addresses from where the new `IP` and `CS` can be retrieved; Also show the new `SP` value and steps involved in handling the interrupt by the 8086 microprocessor. 7

4. a) Drawing the timing diagram, briefly explain the `READ` and `WRITE` operations for `8086` microprocessor. 10

   b) Narrate the function of using 1, 2 and 9 under `INT 21h` instruction. 6

   c) Distinguish between the followings: 9

   i. Polling and Interrupt.
   ii. Memory-mapped I/O and Isolated I/O.

5. a) Find out the similarity between the register sets of 8085 and 8086 microprocessors. 10
   b) Briefly explain the operations of IOPL and NT flags of 80286 microprocessor. 7
   c) To perform `MUL` and `DIV` operation, write two assembly language programs each for `MUL` and `DIV` using: 8
      i. 8086 Data Register Sets
      ii. 8086 Bit Manipulation Instructions

6. a) With an appropriate timing diagram clearly define the following terms: 9
   Clock cycle, *Machine cycle* and *Instruction cycle*.
   b) Differentiate between different `80x86` microprocessors. 9
   c) Derive the contents of the `IN AL, FFh` using the instruction template and also show how the contents of this instruction can be stored in memory. 7

7. a) What is Memory Segment? How is the main memory of 8086 processor segmented? 8
   b) Briefly explain the operations of a Program Counter. 8
   c) Write appropriate assembly language codes to accomplish the following tasks (use as many as possible arithmetic instructions with less number of registers): 9
      i. (30 + 15) * (575 – 225) + 210
      ii. 0Bh * (200 - 225) + 127
      iii. FFFh * 10h + 1111b

8. a) What are real mode, protected mode and virtual mode? Which microprocessor(s) first implements the virtual mode and how? 10
   b) Distinguish between the DX and SX version of 80386 microprocessor. 8
   c) Write an assembly language program structure to clearly state the operational differentiation between `LABEL` and `LOOP`? 7

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B.Sc. Engg. / HD CSE 5th Semester 18 May 2019

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION **WINTER SEMESTER, 2018-2019**

DURATION: 3 Hours **FULL MARKS: 150**

CSE 4503: Microprocessors and Assembly Language

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There are **8 (eight)** questions. Answer any **6 (six)** of them.

Figures in the right margin indicate marks.

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1. a) What is machine language? How can we get machine language from an assembly language? Explain with an example. 10

   b) Briefly explain about multiple interrupt concepts. 8

   c) What are basic differences between `LOOP` and `LEVEL` in assembly language programming? 7

2. a) Derive the contents of the following `MOV` instructions using its coding template and also show how the contents of the instructions can be stored in memory: 12

   i. `MOV DX, BX`
   ii. `MOV AAFFh[DI], AH`
   iii. `MOV AX, [1234h]`

   b) Write an assembly language program that will display "Microprocessors and Assembly Language" 10 (ten) times in different lines with line feed and carriage return. 6

   c) Considering following memory segments, offsets and instructions, write the sequence of PUSH/POP operations on stack segment mentioning different Stack Pointer (SP) values. Assume, initially the stack segment is empty. 7

Segment	Offset	Assembly Language
1000h	0100h	`IN AL, 27h`
1000h	0102h	`MOV DL, AL`
1000h	0104h	`MOV AH, 1`
1000h	0106h	**`INT 21h`**
1000h	0108h	`ADD AL, DL`

3. a) Draw the coding template of `IN` instruction. Explain the significance of using '`MOD`' and '`R/M`' in `MOV` coding template. 9

   b) Write the equivalent assembly language code structures using *conditional jump* and *loop* instructions to implement the *if-else*, *for* and *while* loop operations. 9

   c) Suppose, while debugging an assembly language program the values of the registers are: `Flag=FEB9h, IP=0102h, CS=0500h, SP=FFFCh`. Now, if `INT 21h` is requested, derive the memory addresses from where the new `IP` and `CS` can be retrieved; Also show the new `SP` value and steps involved in handling the interrupt by the 8086 microprocessor. 7

4. a) Write short differentiations between the following 8086 assembly language instructions: 9

   i. `ROL and SHL` ii. `LEA and OFFSET` iii. `NOT and NEG`

   b) Narrate the function of using `1`, `2` and `9` under `INT 21h` instruction. 8

   c) Distinguish between Memory-mapped I/O and Isolated I/O. 8

c) Distinguish between Memory-mapped I/O and Isolated I/O. 8

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5. a) Draw the bus timing diagram for a microprocessor's operation while it performs a WRITE operation toward an OUTPUT unit. 10
   b) What are the basic differences between MIN and MAX mode of 8086 pin diagram? 6
   c) In how many ways can you define an array using assembly language programming? Give example code for each of them. 9

6. a) Draw a comparative table to differentiate between the features of 8086, 80186 and 80286 microprocessors. 10
   b) 'Utilization of parallel processors can be achieved through parallel programming'. How? Prove with appropriate example. 8
   c) Write the functionalities of IOPL and NT flags for 80286 microprocessor. 7

7. a) What do you mean by Coppermine? How do Coppermine and L2 cache memory differ from each other? 8
   b) How are the main memory of 80386 and Pentium processors segmented? Mention the use of address bus pins for both 80386 and Pentium microprocessors. 9
   c) Write an assembly language program, where a MACRO is used to address a string and a PROCEDURE is used to display that string. 8

8. a) Define Thread and Turbo Mode in the context of multi-core processor system? 10
   b) Differentiate between the features of core i3, i5 and i7 processors. 9
   c) Write short notes on: 6
      i. U-Pipeline
      ii. V-Pipeline
      iii. Floating Point Unit (FPU)