



The maximum mark for the examination paper is 60 marks, and the mark obtainable for each part of a question is shown in brackets alongside the question.

Instructions to the candidates:

- ☛ Clarify your answer with the suitable sketches as you can.
- ☛ Please use a pen or heavy pencil to ensure legibility.
- ☛ Please attempt all questions.

QUESTION NUMBER ONE [25 MARKS]

1. List all changed registers and/or memory locations and their final values, for each instruction in the sequence shown below. Also, indicate if each instruction performs a memory access or no memory access at all. [5 Marks]

Initial state:		
EAX = 00067340 h		
EBX = 11016FEB h	00067397 h	73
ECX = FFFFFFFD h	00067386 h	38
EDX = 00AFF321 h	00067385 h	62
ESI = 00067330 h	00067334 h	02
EDI = 00000003 h	00067333 h	C0
Instruction:		
MOV EBX, 00067334 h	00067332 h	AD
LEA EDI, [EBX+ECX]	00067331 h	08
DEC Word Ptr [ESI+2*EDI]	00067330 h	01
NEG Byte Ptr [ESI+ECX]		
XCHG AX, [ESI+2*EDI]		

2. Which of the following instruction is a correct and which is not? Why? Correct if possible. [10 Marks]

- | | |
|----------------------------------------------------|-------------------------------------|
| a) PUSH AL | b) INC [SI] |
| c) MUL [0100 _H] | d) MOV AX, [CX] |
| e) MOV DS, 2A3B _H | f) MOV AL, [SI+DI] |
| g) ADD [0100 _H], [0220 _H] | h) SUB [BX+BP+03 _H], AX |
| i) XCHG [0100 _H], [0220 _H] | j) MOV AL, [BX] |

3. Write an assembly code that swap the content of two register AX and BX [6 Marks]

- a) Using third register
- b) Using the stack
- c) Using ADD, SUB and NEG
- d) Using XOR

4. You have 1 GB of data that you would like to put in a memory segment of an Intel 80386 μ P starting at location 10000000_H. What are the 32-bit base, 20-bit limit, and G-bit values of the descriptor? At what memory location your data ends? [4 Marks]

QUESTION NUMBER TWO [35 MARKS]

- In Intel 8086 μP , assume $SS=1000H$ and $SP=0100H$. How many additional bytes of data can put into stack until it is full? After the stack gets full, where does an extra byte pushed into the stack will be saved? Give the physical address. [4 Marks]
- Trace the following program where $N=16$, what is the purpose of the program. Then, copy a block of data (50 byte) from one memory area from $42000H$ to $44000H$. [8 Marks]

		Page table directory	Page table	4KB memory page
XOR AX, AX	00003FFC	0003F003	00F3C70E	00110EF3
MOV CX, N	00003FF8	0003E003	00F3C70D	00110AC1
Again: ADD AX, CX	00003FF4	0003D003		
CMP CX, 5	00003FF0	0003C003		
JLE XX				
DEC CX, 2	0000200C	00112003	0003C70E	00112003
LOOP Again	00002008	00111003	0003C70D	00111003
XX:	00002004	00110003	0003C70C	00110003
	00002000	00003003		

- Write explanatory notes on virtual memory. If the microprocessor sends linear address $FF1C3FFE$ to the paging mechanism, which paging directory entry and which page table entry is accessed? Note that, the content of $CR0=8000FC2AH$ and $CR3:00003AFBH$. [8 Marks]
- Specify the complete bit configuration of 8085 flag register. Which instruction places the contents of extended flag register onto the stack? The carry flag bit is not modified by which arithmetic operations? [4 Marks]
- Code a descriptor that describes a memory segment that begins at location $03000000H$ and ends at location $05FFFFFFH$. This memory segment is a data segment that grows upward in the memory system and can be written. [5 Marks]
- Is it possible to have two different machine codes for the same instruction? Convert a $67668B048BH$ from machine language to assembly language. Next, give the assembly instruction encoded by the following. [6 Marks]

