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|  | **Ho Chi Minh City University of Technology**  **Department of Electrical and Electronics Engineering** | | |
| **FINAL EXAMINATION**  Grading: 40% | | | **Computer System Engineering**  Course ID: 407406 |
| **Date: 2 Jul, 2018** | | | **Duration:** 90 minutes |
| **Student name:**  **Student ID:** | | | **Examiner’s name & signature:** |
| **Score:** | | Students are allowed to use *one A4 page with two sides* for reference.  Books and other documents are not allowed to use. | |
| **This examination consists of 4 pages** | |

**Problem 1:** (10pts) Answer the following questions:

1. Max clock of 8086 CPU is 5-10MHz 16-20MHz 25-30MHz
2. Segment registers are SI, DI BP, SP CS, DS
3. In an 8086 program, the segment:offset address is 35AF:12D1. Find the five-digit address:

1. CPU 80386 which uses 32-bit physical address can manage :

a) 1 MB of memory

b) 1 GB of memory

c) 4 GB of memory

1. Assume that we have the memory content as below.

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| Address | 0x8 | 0x9 | 0xA | 0xB |
| Content | 62 | 41 | FE | 23 |

What are the 32-bit data when we read a double-word at the address 0x8 with Little Endian mode?

**Problem 2:** (20pts) Answer the value of registers after the instruction is executed.

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| **No.** | **Before** | **Instruction** | **After** |
| 1 | AX: F2 8C | mov AH, 128 | **AX:** |
| 2 | ECX: 00 12 23 5E  Value: DWORD | mov value, ecx | **ECX:**  **Value:** |
| 3 | BX: CA 4E  CX: FF FF | add BX CX | **BX:**  **CX:**  **SF: ZF: CF: OF:** |
| 4 | AX: 7F FF | inc AX | **AX:**  **SF: ZF: OF:** |
| 5 | EAX: FF FF FF F6  Double: FF FF FF D1 | imul eax, Double | **EAX:**  **CF: OF:** |

**Problem 3:** (10pts) Write 80x86 assembly language code for the following C procedure:

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| **C procedure** | **ASM procedure**  *Assume that S is stored in EAX, num is store in EBX, i is stored in ECX* |
| int my\_func(int num) {  in i = 0;  S = 0;  for (i=0; i<num; i++)  {  if(i<=10) sum = sum + 2\*i;  else  sum = sum + i;  }  return sum;  } |  |

**Problem 4:** (10pts) Write 80x86 assembly language code for the following C function. Assume that:

* a is stored in register EAX
* b is stored in register EBX
* rval is stored in register EDX

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| int logical(int a, int b)  {  int t1 = a^b;  int t2 = t1 + 5;  int mask = (1<<13) - 5;  int rval = t2 & mask;  return rval;  } |  |

**Problem 5:**  (10pts) Describe processing steps for interrupt handling?

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**Problem 6:** (10pts) Draw a circuit to demonstrate the external interrupts of 8086 processor, using PIC (Programmable Interrupt Controller) 8259, for three devices: Ethernet, keyboard, and SCSI Disk

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**Problem 7:** (10pts) Write 80x86 assembly language code that initialize vector 48H to point to the ISR

“isr48”. Assume that the CPU operates in Real Mode. Offset address of isr48 is 2358h, and segment address of isr48 is 0200h.

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**Problem 8:** (10pts) 3. Explain **page hit** and **page** **fault** in paging technique.

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**Problem 9:** (10pts) Write C/C++ code to manage the memory

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| **No.** | **Requirement** | **C / C++ code** |
| 1 | - Declare a pointer A of integer.  - Provide memory allocation for 200 integers at the pointer A.  - Free memory at the pointer A |  |
| 2 | - Declare a pointer B of char  - Provide memory allocation for 30 chars at the pointer B.  - Resize the memory allocation of B to 50 chars |  |

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*Electronics Department Lecturer*

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