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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: 14 Dec., 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:** (20pts) Answer the following questions

1. Which technique allows programs to address more than 64 KB memory?

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1. How many bits of external address are there in 8086 processor?

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1. Which registers belong to Core-i5 processor among the following registers: AX, BX, CX, EAX, EBX, ECX, RAX, RBX, RCX?

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1. Find the five-hex-digit address that corresponds to each of these segment : offset pairs

2B87:836A =>

56CD:B24E =>

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

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| --- | --- | --- | --- | --- |
| Address | 0x0 | 0x1 | 02 | 0x3 |
| Content | 62 | 5F | C3 | 2F |

What are the 32-bit data when we read a double-word at the address 0x0 with Big Endian mode?

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**Problem 2:** (20pts) Answer the values of registers after the instructions are executed.

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| **No.** | **Before** | **Instruction** | **After** |
| 1 | AX: 25 A4  BX: FF 34 | mov bx, ax | AX:  BX: |
| 2 | ECX: 0A 76 FF FF | inc ecx | ECX: |
| 3 | EAX: 3A 54 12 4C  EBX: 00 00 00 04 | mul ebx | EAX:  EBX: |
| 4 | EAX: 00 00 00 78 | sub eax, 120 | EAX:  SF: ZF: CF: OF: |
| 5 | AX: 03 10  word at Value: 01 F2 | imul ax, Value | AX:  SF: ZF: 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, N is stored in EBX* |
| int factorial(int N)  {  int i;  int S=1;  if (N ==0)  S = 1;  else{  for (i=1; i<=N; i++)  {  S = S\*i;  }  }  return S;  } |  |

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

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| int arith(int x, int y, int z)  {  int t1 = x+z;  int t2 = y + t2;  int t3 = x+8;  int t4 = y \* 15;  int t5 = t1 + t4;  int rval = t3 \* t5;  return rval;  } |  |

**Problem 5:** (10pts) Write an 80x86 Assembly language program to compute S = 54\*(x+y) - 49\*z + 8. Assume that:

* S is stored in register EAX
* x is stored in register EBX
* y is stored in register ECX
* z is stored in register EDX

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**Problem 6:**  (10pts) Given the Interrupt Vector Table below.



Determine the address of ISR of a device with the interrupt vector FBh.

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**Problem 7:** (10pts) What are the purposes of privilege levels?

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**Problem 8:** (10pts)

1. Write C++ instructions to free the memory of the following array:

Student \*\*p = new Student\*[500];

for(int i=0;i<500;i++)

p[i] = new Student[50];

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1. Write C++ instructions to provide memory allocation for 200 float numbers which are addressed by the pointer q.

*--------------------------------------------------- The end ------------------------------------------------------*

*Electronics Department Lecturer*

**

*Dr. Tran Hoang Linh Dr. Truong Quang Vinh*