|  |  |  |  |
| --- | --- | --- | --- |
|  | **Ho Chi Minh City University of Technology**  **Department of Electrical and Electronics Engineering** | | |
| **FINAL EXAMINATION**  Grading: 40% | | | **Computer System Engineering**  Course ID: 407406 |
| **Date: 7 Aug, 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. How many bit of word size and data path does the 8086 processor have?

|  |
| --- |
| **16 bit word size and 16 bit data path** |

1. Suppose that you discover that RAM addresses 00A50000 to 00A67FFF are reserved for a PC video adapter. How many bytes of memory is this? How many bit for this address is it?

|  |
| --- |
| **95BBytes memory and 17 bit address** |

1. What are advantages and disadvantages of secondary memory?

|  |
| --- |
| **Advantages: on-volatile, high capacity, low price**  **Disadvantages: slower than RAM** |

1. In an 8086 program, the segment:offset address is 235F:42E1. Find the five-digit address:

**278D1**

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Address | 0x0 | 0x1 | 02 | 0x3 |
| Content | 35 | 2A | 4E | F9 |

What are the 32-bit data when we read a double-word at the address 0x0 with Little Endian mode? **F94E2A35**

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

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Before** | **Instruction** | **After** |
| 1 | AX: F2 8C | mov AL, 23h | **EAX: F2 23** |
| 2 | ECX: 00 43 FC 5A  Value: | mov value, ecx | **ECX:** 00 43 FC 5A  **value:** 00 43 FC 5A |
| 3 | BX: 02 3E  CX: FF FF | add BX CX | **BX: 02 3D**  **CX: FF FF**  **SF:0 ZF:0 CF: 1 OF: 0** |
| 4 | AX: 7F FF | sub AX, 200 | **AX: 7F 37**  **SF:1 ZF:0 OF:0** |
| 5 | EAX: FF FF FF E2  Doubleword at Double  FF FF FF D1 | imul eax, Double | **EAX: 00 00 05 82**  **CF: 0 OF: 0** |

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

|  |  |
| --- | --- |
| **C procedure** | **ASM procedure**  *Assume that S is stored in EAX, a is store in EBX* |
| int my\_func(int a)  {  int S=0;  while( a > 2 )  {  S++;  a-= 2;  }  return S;  } | **my\_func:**  **mov EAX, 0**  **WHILE\_LOOP:**  **cmp EBX, 2**  **jnl EXIT**  **inc EAX**  **sub EAX, 2**  **jmp WHILE\_LOOP**  **EXIT:**  **ret** |

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

|  |  |
| --- | --- |
| int arith(int x, int y, int z)  {  int t1 = x+z;  int t2 = y+t1;  int t3 = x+9;  int t4 = y \* 24;  int t5 = t3 + t4;  int rval = t2 \* t5;  return rval;  } | **arith:**  **mov eax, x;**  **add eax, z; // t1 = eax = x + z**  **mov ebx, y;**  **add ebx, eax; // t2 = ebx = t1 + y**  **mov ecx, x;**  **add ecx, 9; // t3 = ecx = x + 9**  **mov edx, y;**  **imul edx, 24; // t4 = edx = y\*24**  **add ecx, edx; // t5 = t3 + t4**  **imul ebx, ecx; // rval = t2 \* t5**  **mov rval, ebx;**  **ret** |

**Problem 5:** (10pts) Write an 80x86 assembly language program to compute F = 9\*a + 3\*b\*c + 2. Assume that:

* a is stored in register EAX
* b is stored in register EBX
* c is stored in register ECX
* F is stored in register EDX

|  |
| --- |
|  |

**Problem 6:**  (10pts) Describe the interrupt processing flow?

|  |
| --- |
| **When an interrupt is received or an exception is detected, the currently running procedure or task is suspended while the processor executes an interrupt or exception handler. When execution of the handler is complete, the processor resumes execution of the interrupted procedure or task.** |

**Problem 7:**  (10pts) What are differences between interrupt and exception?

|  |
| --- |
| * **Interrupts:**   + typically indicate events from external hardware.   + clear the Interrupt Flag (IF - talked about later), Exceptions do not. * **Exceptions:**   + typically indicate error conditions internally   + Generated by CPU |

**Problem 8:** (10pts) Draw a circuit to demonstrate an external interrupt of 8088 processor through the pin INTR with the interrupt vector FAh using buffer IC LS244.

|  |
| --- |
|  |

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

*Electronics Department Lecturer*

*Ass.Prof. Hoang Trang Dr. Truong QuangVinh*