Fast**FAST- National University of Computer & Emerging Sciences, Karachi.  
Department of Computer Science,  
Mid Term I Examinations, Spring 2019.  
27th February, 2019, 9:00 pm – 10:00 pm**

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| **Course Code: EE** 213 | **Course Name:** Computer Organization and Assembly Language | |
| **Instructor:** Muhammad Danish Khan | | |
| **Student’s Roll No:** | | **Section:** |

**Instructions:**

* Attempt all questions.
* Return the question paper.
* Read each question completely before answering it. There are **3 questions on 3 pages.**
* In case of any ambiguity, you may make assumption. But your assumption should not contradict any statement in the question paper.
* All the answers must be solved according to the SEQUENCE given in the question paper, otherwise points will be deducted.
* Where asked for values, only provide the **hex-decimal** values.
* Problems needing iterations should be coded using iterative instructions. No points will be awarded otherwise.

**Time Allowed**: 60 minutes. **Maximum Points**: 30 points

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**Q No. 1** Briefly answer each of the following questions, examples are necessary where asked. [**10 Points**]

1. How direct addressing is different from indirect addressing? Give an example.
2. Discuss the difference between OVERFLOW FLAG (OF) and CARRY FLAG (CF) with the help of an example.
3. Which two registers are used when microprocessor access some byte(s) of data and why?
4. List one special function for each of the data registers (EAX, EBX, ECX, EDX).
5. How PTR is different from LABEL? Briefly explain with the help of an example.

**Q No. 2**

1. Given the following array, using LOOP write some code that should swap the elements in specified order: *1st* with *2nd, 3rd* with *4th, 5th* with *6th, and 7th* with *8th*. [**5 Points**]

ARRAY1 SDWORD 12h, 11h, 14h, 13h,16h,15h, 18h, 17h, 19h, 20h

**After Swapping:** *ARRAY1 = 11h,12h,13h,14h,15h,16h,17h,18h, 19h, 20h*

.data

ARRAY1 SDWORD 12h, 11h, 14h, 13h,16h,15h, 18h, 17h

**.CODE**

**MAIN PROC**

**mov esi, OFFSET array1 ; starting OFFSET**

**mov ebx, TYPE array1 ; doubleword = 4 bytes**

**mov ecx, LENGTHOF array1 ; number of units in arrayD**

**call DumpMem ; display memory**

**MOV ECX, 4**

**L1: MOV EAX, [ESI]**

**XCHG EAX, [ESI+4]**

**MOV [ESI], EAX**

**ADD ESI, 8**

**LOOP L1**

**mov esi, OFFSET array1 ; starting OFFSET**

**mov ebx, TYPE array1 ; doubleword = 4 bytes**

**mov ecx, LENGTHOF array1 ; number of units in arrayD**

**call DumpMem ; display memory**

**ret**

**EXIT**

**MAIN ENDP**

**END main**

1. Assuming the following array, write some assembly code that should sum up all the EVEN NUMBERS in the array and stores the resulting value in a variable named *result*. You must use base-offset addressing mode for processing array elements. [**5 Points**]

ARRAY1 WORD 0, 1, 2, 3, 4 …………………………… 99

MAIN PROC

MOV ESI, 0

MOV EAX, 0

MOV ECX, LENGTHOF ARRAY1/2

L1: ADD AX, [ARRAY1+ESI]

ADD ESI, 4

LOOP L1

MOV RESULT, AX

MAIN ENDP

**Q No. 3** Assume the following data segment (starting from 0000 FFFFh) for the following questions.

.data

arr1 SBYTE 3 DUP(-127)

arr2 WORD 2, 2 DUP(?)

DWORD 2 DUP (7FE09A9h),$

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 0000 FFFF | -127 | 0001 0008 | A9 | 0001 0011 | 00 |
| 0001 0000 | -127 | 0001 0009 | 09 | 0001 0012 | 01 |
| 0001 0001 | -127 | 0001 000A | FE | 0001 0013 | 00 |
| 0001 0002 | 02 | 0001 000B | 07 |  |  |
| 0001 0003 | 00 | 0001 000C | A9 |  |  |
| 0001 0004 |  | 0001 000D | 09 |  |  |
| 0001 0005 |  | 0001 000E | FE |  |  |
| 0001 0006 |  | 0001 000F | 07 |  |  |
| 0001 0007 |  | 0001 0010 | 10 |  |  |

|  |  |  |
| --- | --- | --- |
|  |  | main PROC |
|  | 00FF C10C | MOV AL, [arr1+1] ;-127 |
|  | 00FF C10D | MOV ESI, OFFSET[arr2 +6] ; 0001 0009 |
|  | 00FF C10E | MOV DX, WORD PTR [arr2+7] ; FE09 |
|  | 00FF C10F | ADD AL, AL |
|  | 00FF C110 | MOV ECX, 0Ch |
|  | 00FF C111 | JMP L1 |
|  | 00FF C112 | INC DL |
|  | 00FF C113 | INC CL |
|  | 00FF C114 | L1: SUB CL,DL ; CL = 3 |
|  | 00FF C115 | MOV AL,DL ; AL = 09h |
|  | 00FF C116 | L2: ADD AL, 2 |
|  | 00FF C117 | LOOP L2 ; AL = 0F |
|  | 00FF C118 | MOV BYTE PTR [ESI],AL ; [0001 0009] = 0F 07 FE 17 0Fh |
|  |  | main ENDP |

1. What will be the last element in the data segment?

**0001 0010h**

1. What will be the final value of AL?

**0Fh**

1. What will be the Status of CF, ZF, and OF after line 4 is executed?

CF: **SET(1)** ZF: **CLEAR(0)** OF: **SET(1)**

1. What is stored in EIP after line 6 is executed?

**00FF C114h**

1. Draw Byte by Byte memory (with addresses) for **DWORD array** (unnamed)after execution of above code.

07FE170Fh, 07FE1709A9, 0001 0011

|  |  |  |  |
| --- | --- | --- | --- |
| 0001 0008 | A9 | 0001 0011 | 00 |
| 0001 0009 | 09 | 0001 0012 | 01 |
| 0001 000A | FE | 0001 0013 | 00 |
| 0001 000B | 07 |  |  |
| 0001 000C | A9 |  |  |
| 0001 000D | 09 |  |  |
| 0001 000E | FE |  |  |
| 0001 000F | 07 |  |  |
| 0001 0010 | 10 |  |  |

**STAY BRIGHT**