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| **Cairo University** | **CMP201** | **Total: 20 Points** |
| **Faculty of Engineering** | **Microprocessor Systems** | **2017-2018** |
| **Computer Eng. Department** | **Midterm Exam** | **One Hour** |

**This is an open-book, open notes exam. All electronic devices - Except calculators - are forbidden.  
Make any reasonable assumptions (if necessary)**

1. **[10] Identify the choice that best completes the statement or answers the question**

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| **Answer** | **1- In the Intel architecture, there are actually several buses connecting the CPU to the rest of the computer. Which of the following is not such a bus?** | | | | | | | | | | |
| b | a) The control bus | | | b) The logic bus | | c) The data bus | | d) The address bus | | | |
| b | **2- In the Intel architecture, the “program counter”, which determines where the next instruction is located, is in fact realized by means of which pair of registers?** | | | | | | | | | | |
| a) SP and CS | | | b) IP and CS | | c) IP and DS | | d) SP and DS | | | |
| b | **3- Find the memory address of the next instruction executed by the microprocessor for the following CS:IP combination CS = 2000H and IP = 1000H** | | | | | | | | | | |
| a) 20010 | | | b) 21000 | | c) 2100 | | d) 3000 | | | |
| a | **4- Which flag(s) let you check for signed overflow?** | | | | | | | | | | |
| a) Overflow | | | b) Direction | | c) Interrupt | | d) Carry | | | |
| d | **5- If DS = 90A3H, then the range of physical addresses for the data segment is:** | | | | | | | | | | |
| a) 90A30H – 9FA30H | | | b) 090A3 – 190A2H | | c) 00000H – 090A3H | | | d) 90A30 – A0A2FH | | |
| c | **6- A segment hex value of 35AB together with an offset hex value of 7E21 corresponds to what physical (hex) address?** | | | | | | | | | | |
| a)817BB | | | B)3D6D1 | | c) 3D8D1 | | d)827BB | | | |
| d | **7- one of the following is a legal 8086 instruction?** | | | | | | | | | | |
| 1. dec ip | | | 1. inc ax,1 | | 1. inc [ss] | | 1. add bx, [si] | | | |
| d | **8- Which of the following variables uses the most amount of RAM?** | | | | | | | | | | |
| a) X DB 300 dup(‘A’) | | | b) Z DD 40 dup (0) | | c) Y DQ 255 | | d) W DW 200 dup (0) | | | |
| b | **9- The BP register is typically used for accessing** | | | | | | | | | | |
| 1. data segment | | | 1. stack | | 1. strings | | 1. memory | | | |
| b | **10- To reserve 64-bits in memory --------directive is used.** | | | | | | | | | | |
| 1. DT | | | 1. DQ | | 1. DW | | 1. DD | | | |
| b | **11- Which of the following will generate assembly errors?** | | | | | | | | | | |
| a) var1 db 1101b, 22, 35 | | | b) var3 db '$','98778', | | c) var2 db "ABCDE", 18 | | | | d)None of the above | |
| a | **12-Assume that the AX register contains the value 6521 H. What will be the contents of AX after execution the instruction: SUB AL, AH** | | | | | | | | | | |
| 1. 65BC H | | | 1. 4421 H | | 1. BC21 H | | 1. 6544 H | | | |
| d | **13- The instruction PUSH AL** | | | | | | | | | | |
| a) Decrement SP by 2 and push a word to stack | | b) Increment SP by 2 and push a word to stack | | | | c) Decrement SP by 1 and push a AL to stack | | | | d) None of the above |
| b | **14- What will be the value of the Overflow flag after executing the following instructions? mov al, 80h add al,92h** | | | | | | | | | | |
| 1. OF = 0 | | | 1. OF = 1 | 1. OF = Not affected | | | 1. OF = Unknown | | | |
| b | **15- The value of AX after executing the following code is -------- MOV AX, 1461h MOV DS, AX MOV AL, 05 MOV AH, 07** | | | | | | | | | | |
| 1. 1461h | | | 1. 0705h | | 1. 0507h | | 1. 6114h | | | |
| a | **16- In the following data definition, assume that List2 begins at offset 2000h. What is the offset of the third value (5)? List2 dw 3,4,5,6,7** | | | | | | | | | | |
| a) 2004h | | | b) 2006 | | c) 2002 | | d) 2003 | | | |
| b | **17- What will be the contents of register AL after the following has been executed MOV BX, F78C MOV AL, 7E ADD AL, BL** | | | | | | | | | | |
| a) 6A and carry flag is set | b) 0A and carry flag is set | | | | c) 6A and carry flag is reset | | d) 0A and carry flag is reset | | | |
| d | **18-Which of the following is an invalid instruction?** | | | | | | | | | | |
| 1. add dx,dx | | | 1. MOV AX, CS | | 1. sub bar,5 | | 1. MOV AL, DI | | | |
| a | **19-The conditional branch instruction JNS performs the operations when if** | | | | | | | | | | |
| 1. SF=0 | | | 1. ZF =0 | | 1. CF=0 | | 1. SF=1 | | | |
| c | **20-What values of AX and BX will cause the following jump to occur: CMP BX, AX JG THERE** | | | | | | | | | | |
| 1. AX=2345H, BX=1234H | | | 1. AX = BX | | 1. AX=C000H, BX=0002H | | 1. AX=0002H, BX=C000H | | | |

1. **[4] Identify whether the following instructions are Valid or Invalid. Explain the reason for each Invalid instruction.**

|  |  |  |
| --- | --- | --- |
| **Instruction** | **V/I** | **Reason** |
| MOV BP, SP | **V** |  |
| add ax, [dx+ Yword] | **I** | **DX is not allowed for this addressing mode** |
| mov cx, [bx+4] | **V** |  |
| MOV ES, N | **I** | **Segment registers do not support this mode** |
| MOV DX, DX | **V** |  |
| MOV M, N | **I** | **Invalid addressing mode : Move from memory to memory** |
| MOV AX, SI+DI+2 | **I** | **Invalid addressing mode : should be SI or DI with one of base registers** |
| MOV BX, AX+1 | **I** | **Mnemonic instructions should be ADD or MOV only** |

**3- [2] Using one line only**

a) Declare three 4-byte variables of memory starting at; address “Z”, and initialized to 1, 2, and 3, respectively.

Z DD 1,2,3

b) Array of **10 double words** initialized to **1, 2, ..., 10**.

Y DD 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

c) A string with a message “**Press any key to continue**” ready for output using int 21h / AH=9

prompt\_msg2 Byte " Press any key to continue: ",'$'

**d)** Declare 4-bytes array **of 100** numbers, all initialized to 0, starting at memory location “**Marks**”.

Marks DD 100 DUP(0)

**4- [4] Write a complete assembly program that draws a 20\*20 pixels square moving from left to right. In your code, make a macro that draws a square at certain point with a specific colour.**

; Author: Khaled Mohamad

; Date:13-11-2017

; This program displays a moving square

;---------------------------

ShowSquare MACRO X, Y, COLOUR

Local L1, L2

MOV BX, X

ADD BX, 20

MOV CX, X ; COLUMN

MOV DX, Y ; ROW

MOV AL, COLOUR ;PIXEL COLOR

MOV AH,0CH ;DRAW PIXEL COMMAND

L1: INT 10h

add dx,20

int 10h

sub dx,20

inc cx

cmp cx,bx

jnz L1

mov bx,y

add bx,20

mov cx,x ;Column

mov dx,y ;Row

L2: int 10h

add cx,20

int 10h

sub cx,20

inc dx

cmp dx,bx

jnz L2

ENDM ShowSquare

.MODEL SMALL

.code

MAIN PROC FAR

mov ax,13h

int 10h

mov si,0

L3: ShowSquare si,20,15 ; Draw a White Square

***mov di,1 ; Making a delay (Optional)***

***L4: inc di ;***

***cmp di,2000 ;***

***jnz L4 ;***

ShowSquare si,20,0 ; Draw a black square

add si,1

cmp si,320

jnz L3

HLT

MAIN ENDP

END MAIN