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University Examinations 2023/2024

SECOND YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE COMPUTER SCIENCE AND BACHELOR OF COMPUTER
SECURITY AND FORENSICS

CCS 3252: ASSEMBLY LANGUAGE PROGRAMMING

DATE: APRIL 2024   **TIME: 2 HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE (30 MARKS)

a) Discuss the role of registers in assembly language programming. What are the advantages of using registers?   (4 marks)

b) Use an example to describe the basic structure of an assembly language instruction.
                                                                                    (4 marks)

c) Describe the purpose of the following.   (6 marks)

   i)   ORG 100h

   ii) DUP

   iii) EQU

d) Differentiate between ARM and MIPS architectures.   (2 marks)

e) Describe the purpose of the following general-purpose registers.   (6 marks)

i. Base register (BX)

ii. Stack Pointer register (SP)

iii. Destination Index register (DI)

f) Describe the stack data structure and explain how it is used in assembly language
  programming. (4 marks)

g) Write an assembly language to multiply 2 different values stored in different registers and
  store result into a register. (4 marks)

QUESTION TWO (20 MARKS)

a) Briefly illustrate the purpose of each line in the program below indicating the result of
  each register involved. (6 marks)

  Mov ax,6

  Mov bx,4

  Cmp ax,bx

  Jz L2

  Mov cx,5

  L2:

  Mov cx,7

b) Use examples to illustrate the following as used in assembly language. (4 marks)

  a) AND logical operator

  b) OR logical operator

c) Write an Assembly to divide 9 by 2 and indicated the affected registers. (6 marks)

d) Compute the physical address computed by the processor in displacement addressing mode when DS =100, BX 40, SI = 50 and displacement =35. (4 marks)

QUESTION THREE (20 MARKS)

a) What are the contents of eax, abx and ecx registers after the code fragment below is executed. (4 marks)

section .data

x: dd 54

y: dd 78

section .text

```
mov   eax,   x
mov ebx, [eax]
add   ecx,   ebx
mov eax, [eax]
```

b) Write an assembly language program to move 12 bytes of string data from the source segment 4000H and source index 2000H to destination segment 80001-1 and destination index 6000H (6 marks)

c) Covert the following to hexadecimal. (6 marks)

   i. 672
   ii. 426

d) Use examples to differentiate between JMP and LOOP. (4 marks)

QUESTION FOUR (20 MARKS)

a) Registers have developed from 8-bit to 64-bit processors. Discuss the progression based on general purpose registers. (6 marks)

b) Write an assembly to add 2 numbers using a function/procedure and return the result. (6 marks)

c) Differentiate between data segment and stack segment registers. (4 marks)

d) Write a program to make use of CMP to compare 2 values and give the bigger and the smaller value. Indicate the flags that will be affected (6 marks)

QUESTION FIVE (20 MARKS)

a) Write the meaning of each of lines in the program below. (6 marks)

MOV AX, SEG ;

MOV ES, AX ;

MOV DI, OFFSET ;

MOV CX,10 •

MOV AX, WORD �

CLD ; Clear DF

REPNE SCASW •

a) Differentiate between the following instructions. (4 marks)

   i. DIV and DIV

  ii. MULand IMUL

b) Discuss the concept of interrupts in assembly language programming. How are they handled? (4 marks)

c) Write a program to implement the JUMP instruction. (6 marks)