



# UNIVERSITY EXAMINATIONS

**SECOND SEMESTER 2023/2024 ACADEMIC YEAR**

**SECOND YEAR EXAMINATION FOR THE DEGREE OF  
BACHELOR OF SCIENCE (ICT)**

**COMP 222: ASSEMBLY LANGUAGE PROGRAMMING AND  
MICROPROCESSOR SYSTEMS**

***STREAM: R***

***TIME: 2 HRS***

***DAY: WEDNESDAY[2.30 – 4.30 P.M]    DATE: 10/04/2024***

**THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES**

**PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.**

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**Instructions: Answer question one and any other two**

**Use illustrations where necessary**

**QUESTION ONE (30 MARKS)**

- a) Describe **Four** advantages of using assembly language. [4 Marks]
- b) Distinguish between the following terms as applied to computers: [2 Marks]  
 (i) Source programs and Object programs [2 Marks]
- c) What is a program counter? [2 Marks]
- d) Explain the basic structure of an assembly program [4 Marks]
- e) Differentiate between CISC and RISC types of processors [2 Marks]
- f) Explain the meaning of local and global variables. [2 Marks]
- g) Using a diagram, describe the storage architecture of a computer. Comment on their speeds and size capacities [5 Marks]
- h) What is the biggest binary number you can write with **5** bits? Give the decimal and binary equivalent of the number. [4 Marks]
- i) Describe the use of the following assembly language instructions [3 Marks]  
 i) MOV  
 ii) JMP  
 iii) CMP

**QUESTION TWO [20 MARKS]**

- a) Explain why we say “Assembly Language is Processor-specific” [3 Marks]
- b) State the basic syntax of assembly language statements [4 Marks]



- c) What is an interrupt? [2 Marks]
- d) Write an assembly program to add two numbers [3 Marks]
- e) Discuss the memory segments in an assembly language program. [2 Marks]
- f) Perform the following number systems conversions
- i) Convert the hex number ABC7 to binary [2 Marks]
  - ii) Convert the binary number 1101101110101 to hex [2 Marks]
  - iii) Convert the octal number 325 to binary [2 Marks]

### **QUESTION THREE [20 MARKS]**

- b) Outline five types of addressing modes which determines how data is acquired from the memory unit. [5 Marks]
- c) What is a function? What is the profound difference in operation when using assembly FUNCTION CALLS from the assembly JUMP label? [4 Marks]
- d) Elaborate what the following assembly code does [3 Marks]

```

section .data
    num1 dd 5
    num2 dd 3
    result dd 0

section .text
    global _start

_start:
    mov eax, num1
    add eax, num2
    mov result, eax
    mov eax, 1
    int 0x80

```

- j) Describe the function of the following types of processor registers and give an example in each. [8 Marks]
- i) Data registers
  - ii) Pointer registers



- iii) General registers
- iv) Segment registers.

#### **QUESTION FOUR [20 MARKS]**

- a) Use a diagram to illustrate the detailed instruction cycle process steps. Indicate the registers used in each step. **[8 Marks]**
- b) What is a processor register? State any three classifications of registers **[5 Marks]**
- c) Describe three components that make up Von Neuman machines **[3 Marks]**
- d) Outline **FOUR** features that enable a microprocessor to be a versatile component in an instrumentation system **[4 Marks]**

#### **QUESTION FIVE [20 MARKS]**

- a) What is an operand address? Describe the following three basic modes of addressing **[2 Marks]**
  - i) Register addressing **[2 Marks]**
  - ii) Immediate addressing **[2 Marks]**
  - iii) Memory addressing **[2 Marks]**
- b) Name the two major manufacturers of processors? **[1 Mark]**
- c) What is a system call as used in assembly language? **[2 Marks]**
- d) Identify the three parts of an assembly language instruction in the following statements:
  - (i) add (ax,cx) ;add
  - (ii) mov(hx,ax) **[5 Marks]**
- e) State and explain to forms of execution of assembly conditions **[4 Marks]**

