MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

SIT 311: ASSEMBLY LANGUAGE

DATE: **TIME:**

INSTRUCTIONS: Answer Question ONE and Any Other TWO Questions.

QUESTION ONE (COMPULSORY) (30 MARKS)

a) State THREE main characteristics of Assembly Language operations. (3 marks)

b) Given below is an example of a LABEL directive as used in Assembly language;

```
.DATA
count LABEL WORD
Lo-count DB 0
Hi_count DB 0
.CODE
...
mov Lo_count,AL
mov Hi_count,CL
```

Using the above example, explain what the following refers to;

i. **count** refers to (2 marks)

ii. **Lo_count** refers to (2 marks)

iii. **Hi_count** refers to (2 marks)

c) Direct addressing mode always has TWO main problems that are solved by indirect addressing mode. Illustrate these two main problems in direct addressing mode. (4 marks)

d) Briefly describe TWO basic instructions that allow a programmer to write good Assembly language programs. (4 marks)

e) The processor maintains internal flag bits which show results of the arithmetic and logical functions. Using explanations identify FIVE of these flags. (5 marks)

f) Describe FOUR basic information that are associated with every segment. (4 marks)

h) Write a short Assembly language program that prints a message from a keyboard. Add comments in the program. (4 marks)

QUESTION TWO (20 MARKS)

a) Explain FOUR ways of specifying an operand in Assembly Language programming. (4 marks)

b) Discuss TWO main ways of loading offset value in a register in Assembly language programming. (4 marks)

c) In your first task at your workstation, the management wants to confirm if you understand how a computer operates in relation to Assembly language. Re-arrange the below given steps involved in the instruction execution cycle in the correct order, starting from the first step to the last one. (6 marks)

1. Update the instruction pointer to point to the next instruction.
2. Fetch the instruction operand(s) if necessary
3. Execute the instruction
4. Fetch the instruction at the instruction pointer into the instruction register.
5. Decode the instruction in the instruction register.
6. Go back to the beginning of the instruction execution cycle.

d) Write an assembly language program to find the **smallest number** between two numbers. (6 marks)

QUESTION 3 (20 MARKS)

a) Describe the THREE different classes of Assembly language statements. (6 marks)

b) Explain TWO advantages that defining constants has in Assembly language programming. (4 marks)

c) Explain TWO advantages and TWO disadvantages of having more general-purpose registers in a Microprocessor. (4 marks)

d) Write an **assembly language** program to add 10 data bytes. Data is stored in memory location starting from 4460H. The result is 8 bits only and in stored in 4480H. (6 marks)

QUESTION four (20 MARKS)

a) Assembly language uses the *define* directive. Explain the uses of this directive**.(4 marks)**

b) Using examples illustrate THREE data transfer instruction utilized in Assembly language programming. (6 marks)

c) As a student of Assembly language programming, explain to your peers the relevance of the language in today's world. In your response give practical applications why the language is important in the year 2022. (4 marks)

d) Write a program to add two-BCD numbers where starting address is **2000** and the numbers is stored at **2500** and **2501** memory addresses and store sum into **2502** and carry into **2503** memory address. (6 marks)

QUESTION FIVE (20 MARKS)

a) Using explanations, write the syntax of the Assembly language statement. (4 marks)

b) Use a simple table illustrate the FIVE types of operand combinations allowed in the ***mov*** instruction in Assembly language programming. (5 marks)

c) Describe THREE advantages and TWO disadvantages of microprocessor based systems. (4 marks)

d) Write an assembly language program in a microprocessor to find the maximum and minimum of 10 numbers. (6 marks)