MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO209: MICROPROCESSOR AND ASSEMBLY LANGUAGE PROGRAMMING

DATE: 14/12/2021 **TIME: 2.00-4.00 PM**

INSTRUCTIONS: Answer Question ONE and any other TWO Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a) Describe the components and operation of the 8086 microprocessor. (8 marks)

b) List three general purpose registers and their use in the 8086 architecture. (6 marks)

c) Differentiate between RAM and ROM. (3 marks)

d) Discuss the CPU instruction execution cycle. (6 marks)

e) Discuss the format of assembly language instructions. (7 marks)

QUESTION TWO (20 MARKS)

a) Define a register (2 marks)

b) Explain the purpose of a linker? (2 marks)

c) Define four data transfer instructions supported in the 8086 architecture. (8 marks)

Study the following instructions. [code: 001]

```
1  mov eax, ebx
2  mov BYTE PTR [var], 5
3  push eax
4  push [var]
```

i) Outline the purpose of the 'MOV' instruction in assembly language programming? (2 marks)

ii) Define the instruction set given above line by line. (4 marks)

iii) Assuming the above program was saved as 'myProg.asm' write the nasm command you would issue in a linux terminal to assemble the above program in nasm. (2 marks)

QUESTION THREE (20 MARKS)

a) Describe three BIU functions in the 8086 microprocessors . (6 marks)

b) Explain what flags are and used for in the 8086. (2 marks)

c) Discuss the four memory segments (4 marks)

d) Explain pipelining in microprocessor operation (3 marks)

e) How does a microprocessor communicate to the main memory (2 marks)

f) Define the following terms. (3 marks)

i. Byte.

ii. Word.

iii. Double word.

QUESTION FOUR (20 MARKS)

a) Define the formula to calculate physical address. (4 marks)

b) Transform the following expression into a logic circuit. (4 marks)

$F = XY^{1}Z + W^{1} + (XY+Z)X^{1}$

c) Define the following boolean laws. (2 marks)

i. Identity rule.

ii. Null property.

d) Outline two assembly condition codes. (2 marks)

e) Describe two types of assemblies. (4 marks)

f) Describe the four different components of an assembly (4 marks)

QUESTION FIVE (20 MARKS)

a) Compare and contrast high level language and assembly language (6 marks)

b) Distinguish the difference between a microcontroller and a microprocessor. (4 marks)

c) Describe three buses used for communication in embedded systems. (6 marks)

d) Demonstrate how you would implement FOR LOOP using an assembler. (4 marks)