



MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

UNIVERSITY ORDINARY EXAMINATION

2020/2021 ACADEMIC YEAR

**THIRD YEAR FIRST SEMESTER EXAMINATION FOR BACHELOR OF
SCIENCE IN COMPUTER TECHNOLOGY
SCS 306 – ASSEMBLY LANGUAGE PROGRAMMING**

DURATION: 2 HOURS

Instructions to candidates:

1. Answer question One and Any Other Two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

- a) Define the following terms as used in assembly programming (3 marks)
- Assembler
 - Linker
 - Debugger
- b) Explain the function of each specific machine levels with respect to a computer system. (6 marks)
- c) Convert the hexadecimal number $1AC_{16}$ directly to binary and to decimal. (4 marks)
- d) Perform the binary subtraction of 32_{10} from 43_{10} . (4 marks)
- e) Convert the following C++ statements into equivalent assembly language code
intY;
*intX = (Y + 4) * 3;* (5 marks)
- f) Use a diagram to explain how a multi-stage pipeline processor works. (4 marks)
- g) List the tasks of opening an existing file in an assembly program. (4 marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

- a) Explain the importance of cache memory and the concepts of cache hit and cache miss. (4 marks)
- b) Explain the function of each of the main sections of an assembly language program and give the syntax for declaring each section. (6 marks)
- c) Write a program in assembly to display the message “Hello world” after execution. (10 marks)

QUESTION THREE (20 MARKS)

- a) Use an example in each case to explain how the following addressing modes work (6 marks)
- Register addressing
 - Immediate addressing
 - Direct memory addressing
- b) Explain the meaning of each of the following arithmetic and logical operations (3 marks)
- Inc ebx*
 - ADD ah, bh*
 - AND Mask1, 128*
- c) Use some code snippet to explain how the JMP instruction is used. (3 marks)
- d) State the use of each of the following define directives provided in NASM for reserving storage space for variables and constants. Give an example in each case. (8 marks)
- DB*
 - % assign*
 - EQU*
 - DQ*

QUESTION FOUR (20 MARKS)

- a) Explain when the following CPU flags are set (6 marks)
- i. Zero flag
 - ii. Carry flag
 - iii. Sign flag
 - iv. Overflow flag
 - v. Parity flag
 - vi. Auxiliary carry flag
- b) Write some code snippet to execute a loop for 10 times. (5 marks)
- c) Explain the function of each of the following instructions for processing strings
- i. *MOVS*
 - ii. *CODS*
 - iii. *STOS*
 - iv. *SCAS* (4 marks)
- d) Write some code snippet for a procedure to calculate the sum of two numbers. (5 marks)