



FACULTY OF BASIC AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

1st SEMESTER EXAMINATION, 2019 / 2020 ACADEMIC SESSION

COURSE CODE: CSC 319

COURSE TITLE: Assembly Language Programming

COURSE LEADER: Dr. Kehinde Agbele

DURATION: 2 Hours

INSTRUCTION:

HOD's SIGNATURE

(i) Answer Question ONE and any other TWO questions.

- 1(a) (a) Describe the steps involved in loading and storing programs in machine code.
- (b) Explain with the aid of schematic diagram, how instructions are obeyed during the fetch-execute cycle.
- (c) Write the following pseudocode into close assembly language equivalent.

```
begin
  Final_velocity := Initial_velocity + Second_velocity
if
  Final_velocity <= 120
then
  Final_velocity := Initial_velocity + 50
else
  Final_velocity := Initial_velocity + 10
endif
end
```

- (d) What is meant by an instruction format? Describe the action of the following instructions (i) SUN 20 (ii) ADD @ 20 (iii) ADD 20 (iv) SUB 20, X
- (e) Distinguish between low-level and machine language.
- (f) Define the following terms with examples where applicable: (i) assembler program (ii) assembly language (iii) assembly process (iv) Directives (v) Opcodes (vi) Operands field (vii) Identifiers (viii) Reserved words (ix) Registers
- (g) Complete the table in Figure 1 below

LOCATION	INSTRUCTION MNEMONIC	COMMENTS
18	SUN 20	
19	JAN 13	
20	STOP	
21	HALT	

(f) Write assembly language program segment adding two numbers and storing the results

Labels contents of the locations: $\left[\begin{array}{l} A: 3 \\ B: 5 \\ C: 0 \end{array} \right]$

2. (a) Write an assembly language program that reads a number n and displays the powers of two that are less than n . Your program may assume that n is positive.

(b) Write an assembly language program that reads a number n and displays the value $4n + 3$.

(c) Express in pseudocode an algorithm intended for HYMN to read a number and display its absolute value.

3 (a) The specimen program for assembly language is depicted in Figure 2 below with ALL numbers in Octal. Describe the action comments shown in the table.

OCTAL Location when STORED	PROGRAM	ACTION COMMENTS (All numbers are in OCTAL)
-	START 16	
16 ₈	LDA 7	
17 ₈	SUB N	
20 ₈	STA R	
21 ₈	STOP	
22 ₈	N:5	
23 ₈	R:0	
-	END	

(b) Describe the action of the following instructions.

(i) SUM 7 (ii) LDA 5, X (iii) ADD 7 (iv) LDN30 (v) JPU A

(c) In the context of the compilation of a source program into executable machine code, state what you understand by (i) lexical analysis (ii) Syntactical analysis (iii) Code generation

(d) Compare the use of compilers and interpreters for the translation of high-level languages.

4 (a) Describe the following types of instructions with examples. (i) Arithmetic and logic (ii) Transfer of control (iii) Load and store (iv) Memory reference (v) Input/output memory

(b) Distinguish between a logical shift instruction and an arithmetic shift instruction.

(c) Distinguish between low-level languages and machine language

(d) Describe the following forms of addressing with examples where necessary.

(e) A small one-address computer has storage for 4096 18bit words. Each machine instruction is one complete word and must be able to address directly any cell in the cell. How many different machine-instruction operation codes can there be?