



# MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

SIT 310: FUNDAMENTALS OF PROGRAMMING LANGUAGES

DATE: 11/11/2020

TIME: 2:00 – 4:00 PM

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## INSTRUCTIONS

Answer question ONE and any other TWO questions.

### QUESTION ONE (30 MARKS, COMPULSORY)

- a) Define the following
- i. Pseudo-code (1 mark)
  - ii. Algorithm (1 mark)
  - iii. abstract method (1 mark)
  - iv. static method (1 mark)
- b) Distinguish between the following pairs
- i. Identifier and variable (2 marks)
  - ii. Postfix and prefix expression (2 marks)
  - iii. object and class (2 marks)
  - iv. Setter and getter methods (2 marks)
- c) Suggest data types to represent the following entities (4 marks)
- i. Age of a person.
  - ii. Income of an employee.
  - iii. Registration Number of a student
  - iv. Number of words in a dictionary.
- d) Show how to declare the following in a program
- i. A collection to hold days of the week (2 marks)
  - ii. A type to manipulate memory location of a variable (2 marks)
  - iii. A collection of floating-point numbers (2 marks)

- e) Describe the structure of a Program written in COBOL language (4 marks)
- f) What are the benefits of using modular programming in program design? (4 marks)

### QUESTION TWO (20 MARKS)

- a) Given the following code:

```
float p = 1.0;
int n = 11;
int x=2;
for (int i=1; i<=n; i++) {
    if (n%2 == 1) p = p * x;
    cout << p << endl;
}
```

- i) What is the output of the program? (4 marks)
  - ii) Express the output in terms of x (3 marks)
  - iii) Draw a flow diagram to represent the structure shown above (6 marks)
- b) Using a diagram, explain the phases of the LOOP control structure (7 marks)

### QUESTION THREE (20 MARKS)

- a) Define a function and explain its components (6 marks)
- b) Using specific examples in each case explain the following terms as used in programming
- c) Call-by-value (4 marks)
- d) Call-by-reference (4 marks)
- e) Draw a flow-chart for a program to compute the factorial of a number (6 marks)

### QUESTION FOUR (20 MARKS)

- a) Using an example explain the difference between a **struct** and a **class** (5 marks)
- b) What do you understand by the following terms as applied to object oriented programming (Use an example to explain)
  - i. Constructor (2 marks)
  - ii. Method overloading (3 marks)
  - iii. Method overriding (3 marks)
  - iv. Inheritance (3 marks)
- c) Convert the following Postfix expressions to Prefix Expressions
  - i) **AB+CD-\*** (2 marks)
  - ii) **ABC/-AK/L-\*** (2 marks)

**QUESTION FIVE (20 MARKS)**

- a) Describe the structure of a C Program (6 marks)
- b) Write down an algorithm in a natural language that can be used to find out the maximum number from a given set of numbers ( $L_1, L_2, L_3, L_4, \dots, L_n$  where  $n > 0$ ) (6 marks)
- c) Programming has experienced a number of paradigm shifts since the times of Blaise Pascal in 1776. Describe the historical trend in computer programming till today (8 marks)