



MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR SCIENCE (COMPUTER SCIENCE)

SCO 306: PROGRAMMING LANGUAGES

DATE:28/7/2023

TIME:2.00-4.00 P.M

INSTRUCTIONS:

*This paper consists of **FIVE** questions.*

*Answer **QUESTION ONE** and other **TWO** questions in this paper.*

QUESTION ONE (COMPULSORY 30 MARKS)

- a) To evaluate a language we use different criteria, explain TWO ways (4 marks)
- b) Compare ADA and ALGOL 68 programming languages using their respective syntax (4 marks)
- c) Describe a visual programming environment and how it is used. (4 marks)
- d) Identify the lexeme and token in the statement below: - (4 marks)
$$\text{index} = 2 * \text{count} + 17$$
- e) Distinguish between language design time and language implementation time (4 marks)
- f) Describe TWO-character string length options (4 marks)
- g) Explain the operator evaluation order of C based programming language using associativity (3 marks)
- h) Using C++ language, illustrate multiple selection construct (3 marks)

QUESTION TWO (20 MARKS)

- a) Describe, TWO major domains in which programming languages are applied (4 marks)
- b) In local referencing, local variables can either be static or dynamic. State TWO advantages and TWO disadvantages of using static and dynamic (8 marks)
- c) Explain the THREE choices in a referencing environment that can be used for executing a passed subprogram (6 marks)
- d) Calculate the weakest precondition of below assignment statement (2 marks)
$$x = 2 * y - 3 \{x > 25\}$$

QUESTION THREE (20 MARKS)

- a) Using a parse tree, demonstrate ambiguity for the statement $A = B + A * C$ (4 marks)
- b) With examples, describe FOUR reasons why dangling pointers are dangerous in a programming language. (8 marks)
Using a diagram illustrate the THREE distinct semantic models for parameter passing when values are copied. (6 marks)
- c) State TWO ways in which a programming language can be formally defined. (2 marks)

QUESTION FOUR (20 MARKS)

- a) Using an example, in a programming language of your choice, write a program that shows an implementation of an abstract class. Explain the various parts of your program. (8 marks)
- b) Briefly explain the meaning of abstraction principle as a concept in modern programming. State TWO advantages of using this concept. (4 marks)
- c) Algol-60 provided two parameter-passing mechanisms: call-by-value and call by-name. Explain these mechanisms. (4 marks)
- d) Distinguish operational and axiomatic semantics. (4 marks)

QUESTION FIVE (20 MARKS)

- a) Describe THREE circumstances in programming that may lead to the occurrence of an exception, giving an example of a program snippet for each of the circumstances. (6 marks)
- b) A selection statement provides the means of choosing between two or more paths of execution. Explain TWO general categories that can be applied. (4 marks)
- c) Discuss THREE benefits for studying programming languages. (6 marks)
- d) Explain the results that would be printed by below block of code (4 marks)