



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR FIRST SEMSTER EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 306: PROGRAMMING LANGUAGES

DATE: 10/8/2021

TIME: 2:00 – 4:00 PM

INSTRUCTIONS

This paper consists of FIVE questions

*Answer **question one** and other **two questions** in this paper*

QUESTION (COMPULSORY) (30 MARKS)

- a) Distinguish between Backus Naur Form (BNF) and Extended Backus Naur Form (EBNF) as formalisms for representing context free grammars. (4 marks)
- b) Calculate the weakest precondition in the following assignment statement (4 marks)
$$x = 2 * y - 3 \{x > 25\}$$
- c) Develop a parse tree for the statement $A = B + A * C$ (4 marks)
- d) A programming language can be formally defined in two distinct ways: by recognition and by generation. Using an example in each case, explain. (4 marks)
- e) Explain TWO characteristics of pure functions (4 marks)
- f) Discuss THREE aspects of language characteristics that affect writability (6 marks)
- g) Explain TWO conceptual models of data transfer in parameter transmission (4 marks)

QUESTION TWO (20 MARKS)

- a) i) Describe TWO circumstances in programming that lead to the occurrence of an exception (4 marks)

- ii) Give an example of a program snippet for each of the circumstances. (2 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) Differentiate between static type binding and dynamic type binding (4 marks)

QUESTION THREE (20 MARKS)

- a) Explain THREE major programming language domains (6 marks)
- b) Discuss TWO advantages and TWO disadvantages of each type of local variables (8 marks)
- c) Describe TWO sequence of operations that creates a dangling pointer in programming languages (4 marks)
- d) Distinguish between denotational and operational semantics. (2 marks)

QUESTION FOUR (20 MARKS)

- a) Explain the criteria used to evaluate a programming language (5 marks)
- b) Explain THREE programming language categories (6 marks)
- c) Algol-60 provided two parameter-passing mechanisms: call-by-value and call by-name. Discuss these mechanisms. (4 marks)
- d) An array is declared with 5 elements. A program is required to use an exception handler to ensure that only elements within the correct index values can be displayed, when required. Explain each (5 marks)

QUESTION FIVE (20 MARKS)

- a) i) Explain the principle of abstraction. (2 marks)
- ii) Outline FOUR characteristics of an abstract class. (4 marks)
- b) Write a C++ programming language program to implement class abstraction (8 marks)
- c) Define a loop and give examples of various types of loops used in programming languages (6 marks)