

MACHAKOS UNIVERSITY
SUPPLIMENTARY EXAMINATION FOR THE DEGREE OF BACHELOR
OF SCIENCE IN COMPUTER SCIENCE
SCO 306: PROGRAMMING LANGUAGES

Date:

Time:

INSTRUCTIONS: Attempt Question ONE and ANY other TWO

QUESTION ONE

- a. List the main FIVE goals (reasons) for studying the formal semantics of programming languages **[5 marks]**
- b. Using an example, explain how *sub routines* implement *flow of control* in programming language. **[4marks]**
- c. Discuss the following criteria used to determine the quality of programming language. **[6marks]**
 - i. Extensibility
 - ii. Standardability
 - iii. Implementability
- d. List any FIVE Primary Reasons for Good Programming Language Design **[5 marks]**

QUESTION TWO

- a. Object-oriented programming is one of the programming language that is in wide use today. Explain the following terms as used in Object Oriented programming **[10 marks]**
 - i. Polymorphism
 - ii. Abstraction
 - iii. Message passing
 - iv. Encapsulation
 - v. Class
- b. Explain the principle of functional languages. Give two examples of functional languages. **[5marks]**
- c. Discuss the key principles of object oriented programming paradigm. **[5marks]**

QUESTION THREE

- a. Explain the concept *Orthogonality* of a programming language. Give three ways in which a language may fail to achieve *Orthogonality* characteristic. **[6 marks]**
- b. List and explain the TWO types of semantics in programming **[4 marks]**
- c. List and explain the three major classes to formal semantics as used in programming languages **[6 marks]**
- d. Using examples differentiate between *concrete syntax* **and** *abstract syntax*. **[4marks]**

QUESTION FOUR

- a. Discuss the following variations of formal semantics as applied in many programming languages **[8 marks]**
 - i. Action semantics
 - ii. Predicate transformer semantics
 - iii. Algebraic semantics
 - iv. Concurrency semantics
- b. To manage the size of program code in many programming languages, control structures are mandatory. List and Explain the three control structures **[6 marks]**
- c. In context of *data integrity* and *flexibility*, compare and contrast *typed* and *untyped languages*. Give example language in each category. **[6marks]**

QUESTION FIVE

- a. Explain the following types of data structures as its applied in many programming languages **[10 marks]**
 - i. Array
 - ii. Union
 - iii. Graphs
 - iv. Structures

v. Set

b. In context of type systems, explain the following concepts. Use examples programming languages **[6mark]**

- i. Type loopholes
- ii. Latent typing
- iii. Type-inferred

c. List any FOUR programming Language Evaluation Criteria when choosing the language to use in program development **[4 marks]**