

**KENYA METHODIST UNIVERSITY**

**End of Trimester Examination, April 2008**

**Faculty** : **Science and Social Studies**  
**Department** : **Computer and Information Science**  
**Course Code** : **COMP 310**  
**Course Title** : **Programming Language Design**  
**Time** : **2 Hours**

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**INSTRUCTIONS: Answer Question ONE (Compulsory) and ANY OTHER TWO questions:**

**Question One (30 Marks):**

- (a.) Define:
- i. Computer
  - ii. Data object
  - iii. Programming language (3 marks)
- (b.) Briefly describe the THREE categories of sequence-control structures (6 marks)
- (c.) State and briefly explain the two main parts of the compilation process (4 marks)
- (d.) Describe ambiguity as used with respect to context-free grammars (2 marks)
- (e.) Define a data type and state the three basic elements of data type specification. (5 marks)
- (f.) Each time a programming language is implemented, the implementer tends to a slightly different virtual computer in the language definition. Describe the three factors that lead to differences among implementations of the same language. (6 marks)
- (g.) Briefly describe the following aspects in high level languages:
- i. Support for abstraction.
  - ii. Naturalness. (4 marks)

**Question Two (20 Marks):**

- (a.) Give one similarity and one difference between software simulation and translation. (4 marks)
- (b.) State two goals in the choice of the syntactic structure for a programming language (2 marks)
- (c.) State the concepts that must be addressed when considering parallelism in programming languages. (4 marks)
- (d.) Most modern compilers are syntax-directed compilers.
- i. Briefly describe a syntax-directed compiler. (2 marks)

- ii. With the help of a diagram, describe the structure of a syntax-directed compiler. (8 marks)

**Question Three (20 Marks):**

- (a.) The influence of the environment on the programming languages is seen in four major areas.
- i. State the four areas of influence (4 marks)
  - ii. Briefly describe the real-time environment (2 marks)
  - iii. With view to these four areas of influence, briefly describe the effects of the batch-processing environment on the design of programming languages (4 marks)
- (b.) State and briefly explain the two central problems in storage management, arising because of the interplay between the lifetime of a data object and the access paths of it. (4 marks)
- (c.) Describe briefly the following terms:
- i. Derivation.
  - ii. Token. (4 marks)
- (d.) State two objectives in the design of a programming language (2 marks)

**Question Four (20 Marks):**

- (a.) Each construct in a programming language has both a logical meaning and implementation. With reference to an integer data object, discuss this statement (4 marks)
- (b.) Apart from exception-handling control structure, state FOUR subprogram scheduling techniques (4 marks)
- (c.) Describe polymorphism as used with class-inheritance in object-oriented programming languages (2 marks)
- (d.) State and briefly explain FIVE major components of a computer that correspond closely to the major aspects of a programming language (10 marks)