



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST SEMESTER EXAMINATION FOR DEGREE IN BACHELOR OF SCIENCE IN COMPUTER SCIENCE

SCO 306: PROGRAMMING LANGUAGES

Date: 1/8/2016

Time: 2:00 – 4:00 PM

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. (4 marks)
- c) Discuss the following criteria used to determine the quality of programming language. (6 marks)
 - 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. (5 marks)
- c) Discuss the key principles of object oriented programming paradigm. (5 marks)

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*. (4 marks)

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. (6 marks)

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 (6 marks)
- i) Type loopholes
 - ii) Latent typing
 - iii) Type-inferred

List any FOUR programming Language Evaluation Criteria when choosing the language to use in program development (4 marks)