



MACHAKOS UNIVERSITY

University Examinations for 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

**THIRD YEAR SECOND SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE (COMPUTER SCIENCE)**

SCO 306: PROGRAMMING LANGUAGES

DATE: 20/12/2017

TIME: 2:00 – 4:00 PM

INSTRUCTIONS: Answer Question ONE and any other TWO Questions

QUESTION ONE (30 MARKS)

- a)
 - i) Briefly explain what Programming Languages as a unit is all about. (2 marks)
 - ii) Outline five benefits obtained from studying Programming Languages. (5 marks)
- b)
 - (i) The program development process goes through various stages. Using a suitable diagram, describe these stages. (6 marks)
 - (ii) Four of the criteria used to evaluate programming languages are, readability, portability, simplicity, and orthogonality. Explain the meaning of these four criteria, giving an example of each. (8 marks)
- c) With the help of a program statement, differentiate the following programming concepts:
 - i) Syntax
 - ii) Semantics
 - iii) Pragmatics. (6 marks)
- d) Distinguish denotational, operational and axiomatic semantics. (3 marks)

QUESTION TWO (20 MARKS)

- a) Two of the programming domains being currently used are Scripting languages, and Systems programming languages. Differentiate these two programming domains, giving an example of a language used in each. (4 marks)
- b) Control structures are a commonly programming feature used in programming.
 - i) Explain the significance of control structures in programming. (2 marks)
 - ii) Using appropriate flow chart diagrams, differentiate iteration from decision control structures, given an example program construct used in each one of them. (9 marks)
 - iii) Using a language of your choice, write a program that displays all the numbers between 30 and 50 in reverse order, and in steps of 3. (5 marks)

QUESTION THREE (20 MARKS)

- a) One of the common constructs with all high level programming languages is the use data structures. Using a suitable diagram, describe the stack data structure. (4 marks)
- b) Discuss three real life application areas of the stack data structure. (6 marks)
- c)
 - i) Explain the tasks performed by the *push()* and *pop()* operations of the stack. (2 marks)
 - ii) Write short programs to illustrate how each of the above operations can be implemented in a stack. Explain your programs. (8 marks)

QUESTION FOUR (20 MARKS)

- a) Briefly explain the significance of exception handling in programming. (2 marks)
- b) Discuss 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)
- c)
 - i) In as far as exception handling is concerned, and using a suitable general format of a program structure, differentiate between *throw*, *try* and *catch* blocks. (6 marks)

- (ii) 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 (6 marks)

QUESTION FIVE (20 MARKS)

- a) i) A common concept used in modern programming is the principle of abstraction. Briefly explain the meaning of this principle. (2 marks)
- ii) Outline two advantages of using abstraction in programming. (2 marks)
- b) i) Abstraction is usually illustrated better in object oriented programming using the concept of abstract classes. Outline four characteristics of an abstract class. (4 marks)
- ii) 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. (12 marks)