

CHUKA



UNIVERSITY

**UNIVERSITY EXAMINATIONS**

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN  
COMPUTER SCIENCE**

**COMP 404: OBJECT – ORIENTED PROGRAMMING (JAVA)**

**STREAMS: BSC (COMPUTER SCIENCE)**

**TIME: 2 HOURS**

**DAY/DATE: WEDNESDAY 05/12/2018**

**2.30 P.M. – 4.30 P.M.**

**INSTRUCTIONS**

- Answer QUESTION 1 and any other TWO QUESTIONS from section B.
- This is a CLOSED BOOK EXAM, No reference materials allowed.
- Write you answers legibly and use your time wisely.

**SECTION A: COMPULSORY**

**Question one: 30 Marks**

a Explain the meaning of the following concepts:

- |                        |           |
|------------------------|-----------|
| (i) Object             | [2 marks] |
| (ii) Class             | [2 marks] |
| (iii) Abstract class   | [2 marks] |
| (iv) Method overriding | [2 marks] |
| (v) Method overloading | [2 marks] |

b With use of sketches to illustrate your answer, explain the concept of inheritance as used in object oriented programming. [6 marks]

- c Make use of class examples to show the difference between local and global variables [4 marks]
- d Explain the difference between a constructor and a method [4 marks]
- e When would private and protected class members be used in an object oriented Program? Clearly distinguish between them. [2 marks]
- f Explain the terms *abstract* data type and *encapsulation* and describe how they implement coupling and cohesion in an object oriented system. [4 marks]

**SECTION B: CHOOSE ONLY TWO QUESTIONS FROM THIS SECTION**

**QUESTION TWO:[20 marks]**

The Fibonacci numbers are a sequence of Integers starting 1, 1, generated such that every subsequent number is the sum of the previous two. For example, the third number in the Fibonacci sequence is 2(because  $1+1=2$ ), and the fourth number is 3(because  $2+1=3$ ).

Fibonacci numbers are used in several algorithms in Computer Science, including the Fibonacci Search and in the generation of fractals.

- (a) In an object oriented programming language such as Java, create a class called `fibonacciClass` capable of holding Fibonacci numbers in an array called `F`. Include a data member called `currentNumbersHeld` that will record how many of the numbers are currently being held. [4 marks]
- (b) Include a constant called `maxNumbers`, set to 100, that stipulates the maximum number of Fibonacci numbers that can be held. [4 marks]
- (c) Add a `getter()` method that returns `currentNumbersHeld`. [6 marks]
- (d) Add a method called `generateSequence()` that will populate the array with the Fibonacci numbers accepting one integer argument, `N`, that specifies how many numbers to generate. [4 marks]

(e) Implement a method called `displaySequence()` that will display the Fibonacci sequence currently stored in the array in the format [2 marks]

**QUESTION THREE 20 MKS**

Discuss what you understand by object oriented programming and the common characteristics found in object oriented programming. Use code samples to elaborate your answer. Your discussion should be based on the following:

- i Inheritance [5 marks]
- ii Polymorphism [5 marks]
- iii Encapsulation [5 marks]
- iv Instances [5 marks]

**QUESTION FOUR 20 MKS**

- a Illustrate with use of a counter controlled loop, how you would display a multiplication table of squares of numbers from 1 -10. [10 marks]
- b With the use of an appropriate example, explain the use of new operator as used in object oriented programming [5 marks]
- c Write a recursive method that returns a cube of any integer passed to it. [5 marks]

**QUESTION 5 20 MKS**

- a What is an access modifier? Discuss the various types of access modifiers [6 marks]
  - b Briefly explain each of the following Java terms: [10 marks]
    - (i). static method
    - (ii). dynamic binding,
    - (iii). cast expression,
    - (iv). protected, overriding,
    - (v). this
  - c In Java, method parameters are passed by value — explain what this means and give examples of the consequences [4 marks]
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