CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

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

ACSC 223: OBJECT ORIENTED PROGRAMMING, JAVA (1)

STREAMS: Y2S1   **TIME:2 HOURS**

DAY/DATE: THURSDAY 5/12/2019   **8.30 A.M – 10.30 A.M**

INSTRUCTIONS:
- Answer **QUESTION 1** and any other **TWO QUESTIONS** from section B.
- This is a CLOSED BOOK EXAM, No reference materials allowed.
- No use of mobile phones, no electronic calculators.
- Write you answers legibly and use your time wisely.

QUESTION ONE: 30 MARKS

a. All methods in Java are dynamic polymorphic as a design choice. Discuss the advantages and disadvantages of making dynamic polymorphism optional for Java methods.
[6marks]

b. When working with Primitive Data, you can assign a lower precision to a higher precision because Java will implicitly cast.   Explain.
[4marks]

c. If an attribute is private, explain the methods that have access to it.

[4marks]

d. How does java know that an object is no longer needed. What happens to that object. Illustrate your answer?
[4marks]

e. With use of illustrations, describes the concept of polymorphism
[6marks]

f. Using example Java code, distinguish between overloading, overriding and shadowing
when applied to Java methods.   [6marks]

SECTION B: CHOOSE ANY TWO QUESTIONS

QUESTION TWO:

a.   With use of examples, explain the purpose of access modifiers in OOP languages.
[8 marks]

b.   Differentiate between encapsulation and abstraction
[4marks]

c.   Explain the different forms of polymorphism.
[8marks]

QUESTION THREE 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(because2+1=3).

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

(a) create a class in java 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.
[4marks]

(b) Include a constant called **maxNumbers**, set to 100, that stipulates the maximum number of Fibonacci numbers that can be held.
[4marks]

(c) Add a **getter()** method that returns **currentNumbersHeld**.
[6marks]

(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.
[4marks]

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

QUESTION FOUR 20 MARKS

A palindromic word is one that reads the same backwards as forwards. Hence the words hello
and peel are not palindromes, but the words peep, deed and dad are palindromes.

a) Create a class called Palindrome.   [2 marks]

b) In your Palindrome class, create a method called reverse() which takes a string argument.
Your method should return the reverse of the argument as a string. For example, if the argument
is _Foobar_ then your method should return _rabooF_.

[8
marks]

c) Create a second method in Palindrome called isPalindrome() which takes a string argument.
This method should return True if the argument is a palindrome and False otherwise.

[10
marks]

QUESTION 5 20 MARKS

1. Consider the following code in Object Oriented Programming. it defines the start
   of a class to represent bank accounts:

Public class BankAccount{

Int interest_rate = 0.3
Public BankAccount(String name, int number, double balance):
this.name = name;
this.number = number;
this.balance = balance;

return 0;

a) Add instance methods called deposit() and withdraw() which increase and decrease the balance of the account. Make sure the withdraw() method doesn't allow the account to go into overdraft. Add a third method called add_interest() which adds interest to the balance (the interest should be the interest rate multiplied by the current balance). [10 marks]

b) Create a subclass of BankAccount called StudentAccount. Every StudentAccount should have an overdraft limit of Kshs 1000. Write a constructor for the new class. Override the withdraw() method to make sure that students can withdraw money up to their overdraft limits.
[10 marks]