

CHUKA



UNIVERSITY

RESIT/ SPECIAL EXAMINATIONS

**SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE OF
BACHELOR OF COMMERCE**

**COSC 104/BBAM /BCOM 270: INTRODUCTION TO PROGRAMMING
METHODOLOGIES**

STREAMS: BCOM Y2S1

TIME: 2 HOURS

DAY/DATE: THURSDAY 26/7/2018

2.30 PM – 4.30 PM

INSTRUCTIONS:

- Answer **QUESTION 1** in section A and any other **TWO QUESTIONS** from section B.
- Write your answers **legibly** and use your time wisely.

QUESTION ONE [30 MARKS]

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

```
classBankAccount (object) :  
interest_rate = 0.3  
def __init__(self, name, number, balance):  
self.name = name  
self.number = number  
self.balance = balance  
return
```

- a) Name all the class variables and the instance variables in the given code.

[10 marks]

- b) 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]**

c) Create a subclass of `BankAccount` called `StudentAccount`. Every `StudentAccount` should have an overdraft limit of 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]**

SECTION B: ANSWER ONLY TWO QUESTIONS FROM THIS SECTION

Question 2 [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]**

HINT: Probably the easiest way to do this is to use the result of your `reverse()` method and compare the string against its reverse.

d) Write some code to test your new `Palindrome` class and print out results of your testing to the user. Give some consideration to what sort of strings you might want to use for your testing. **[10 marks]**

Question 3 [20mks]

By use of control constructs, demonstrates how the following would be achieved.

a) A program to sum the number of integers from 1 to a given number n. **[4 marks]**

b) A program which sums the contents of a integer list or array. **[4 marks]**

c) Translate the following `for` loop into a `while` loop (which does the same thing as the `for` loop):

```
for i in range(1,10):  
    print "i = ", i
```

[8 marks]

d) Translate the following `while` loop into a `for` loop (which does the same thing as the `while` loop):

```
i = 20
```

```
while (i > 0):
```

```
print "i = ", i
```

```
i -= 1
```

[4 marks]

Question 4 (20 marks)

a) What differentiates a function from a procedure? illustrate

[4marks]

(b) Explain how a function or a procedure simplifies the task of programming.

[6marks]

Write a program that uses a function to calculate the area of a circle

[10marks]

Question 5 [20 marks]

a) What is a recursive function?

[2 marks]

b) The following iterative function returns the sum of all elements in a list. For example, given the list [1, 2, 3] the function will return 1+2+3 or 6. Re-write the function as a recursive function.

```
def sum(arg):
```

```
    result = 0
```

```
    for i in arg:
```

```
        result += i
```

```
    return result
```

[10 marks]

c) The following code implements a recursive function in Python called `foobar`. What does the `foobar` function do? Write a line of code which calls the `foobar` function with a suitable argument and state what the return value will be.

```
def foobar(arg):
```

```
    if arg == []:
```

```
        return arg
```

```
    else:
```

```
        return foobar(arg[1:]) + [ arg[0] ]
```

[8 marks]

END.
