



**UNIVERSITY EXAMINATIONS
EXAMINATIONS FOR THE AWARD OF BACHELOR OF SCIENCE
IN COMPUTER SCIENCE**

COSC 223: OBJECT ORIENTED PROGRAMMING 1(JAVA)

STREAMS: BSC (COMP SCIENCE)

TIME: 2 HOURS

DAY/DATE: MONDAY 08/4/2019

11.30 A.M. – 1.30 P.M.

INSTRUCTIONS

- Answer Question **ONE** and any other **TWO** questions.
- Diagrams should be used whenever they are relevant to support an answer.
- Sketch maps and diagrams may be used whenever they help to illustrate your answer
- Do not write anything on the question paper
- This is a **closed book exam**, No reference materials are allowed in the examination room

SECTION A: COMPULSORY

Question one [Compulsory]: 30 Marks

- a. Every variable is created (or allocated) at some definite time and destroyed or deallocated at some later time. This interval period can be referred to as lifetime. Classify variables according to their lifetimes. [4 marks]
- b. Method parameters and arguments are widely used in object oriented programming. Explain what they are and their importance [2 marks]
- c. Outline the basic structure of a java program [2 marks]
- d. Write a sample java program to demonstrate how to compute the area of a circle, [user inputs the radius]. [5 marks]
- e. Which method begins the execution of java applications? Give its full declarations [3marks]
- f. Differentiate between method overloading and method overriding? [4 marks]

- g. What are constructors? Giving an example, show why they are useful in java programming [4 marks]
- h. Write a java application that prints, on separate lines, you name, your birthday, your hobbies and your favorites books. Label each piece of information in the output. [6 marks]

SECTION B: [Answer any 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 MARKS]

COSC 223

Discuss what you understand by object oriented programming and the common characteristics found in object oriented programming. Your discussion should be based on the following:

- (i) Class [2 marks]
- (ii) Inheritance [4 marks]
- (iii) Polymorphism [6 marks]
- (iv) Encapsulation [2 marks]
- (v) Abstraction [6 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:
 - (i). static method [2 marks]
 - (ii). dynamic binding [2 marks]
 - (iii). cast expression [2 marks]
 - (iv). protected, overriding [2 marks]
 - (v). "this" keyword [2 marks]
 - 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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