MASENO UNIVERSITY

UNIVERSITY EXAMINATIONS 2017/2018

FIRST YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

CITY CAMPUS

CIT 108: OBJECT ORIENTED PROGRAMMING I

Date: 14th June, 2018   Time: 5.00 - 8.00pm

INSTRUCTIONS:

- Answer Question ONE and any other TWO
- Start each question on a new page
- Mobile phones are prohibited in the examination room
- Fasten together all loose answer sheets used.

Question one (30 Marks)

a) Explain the following concepts as applied in object oriented programming **(6 marks)**
   i)   class
   ii)   object
   iii)   Encapsulation
   iv)   Polymorphism
   v)   Abstraction
   vi)   Inheritance

b) Differentiate between the following using relevant examples **(8 marks)**
   i)   A variable and a constant
   ii)   Method overloading and method overriding
   iii)   Parameter and argument
   iv)   Primitive data types and Nonprimitive data types

c) Study the following program then write its output.**(4 marks)**

```
class TwoDArray {
public static void main(String args[]) {
inttwoD[][]= new int[4][5];
inti, j, k = 0;
        for(i=0; i<4; i++)
           for(j=0; j<5; j++) {
twoD[i][j] = k;
              k++;
           }
       for(i=0; i<4; i++) {
           for(j=0; j<5; j++)
System.out.print(twoD[i][j] + " ");
System.out.println();
           }
       }
}
```

d) Write a Java program using while loop that will compute the sum of odd integer numbersfrom   1 to 20000and print the result on the screen.**(4 marks)**

e) Write a Java program that will accept the radius typed from the keyboard then compute the area and circumference using the following formulas: Area = PI * radius squared; Circumference = 2.0 * PI * radius; PI is a constant whose value is 3.142.The program should display the computed area and circumference on the screen**(8 marks)**

Question Two (20 marks)

Write a Java program that will be used in computing the net pay for each employee in an organization, given the following details. The program should allow a user to enter the following details:

1. Employee number e.g. pf:2943
2. Employee Name e.g. James Gareth
3. Salary e.g. 40000
4. House allowance e.g. 10000

Computations are done as follows:

- Gross Pay = salary + allowance
- P.A.Y.E -this is the amount of tax charged on gross pay .This amount should be generated automatically by the system using the following tax brackets:

Gross Pay	P.A.Y.E
Below 10,000	No tax charged
10,001 to 60,000	10%
60,001 to110,000	15%
110,001 to 160,000	20%
160,001 to 210,000	25%
210,001 and above	30%

- For Example: If the gross pay is 140,000; the first 10,000 is not taxed; the next 50,000 is taxed 10%, the next 50,000 is taxed 15%, etc until the gross pay is exhausted. The sum of tax in the affected tax brackets make the P.A.Y.E
- Net Pay = Gross pay – P.A.Y.E

The following values should be displayed on the screen in the following format:

Employee_number	Employee_name	Salary	House_allowance	Gross_pay	P.A.Y.E	Net_pay
pf:2943.	James Gareth	40000	10000	50000	4000	56000

(20 marks)

Question Three (20 Marks)

a) Define the term constructor as applied in object oriented programming. State two characteristics of a constructor(**2 marks**)

b) Given the following classes: Square which is a super class, has data members: length, area, perimeter of type integer; methods: computeArea() that takes length of integer value, computes the area and returns area; computePerimeter() that takes length of integer value, computes the perimeter and returns perimeter;DisplayInfo( )which displays the values of length, area and perimeter on the screen.
Rectangle which is a subclass of Square, has data members: length, width, area, perimeter of type integer; methods: computeArea( ) that takes length and width of integer values, computes the area and returns area; computePerimeter( ) that takes length and width of integer values, computes the perimeter and returns perimeter; DisplayInfo( ) which displays the values of length, width, area and perimeter on the screen.All members of the two classes are assumed to be public.

    i)   Write a Java program to represent the above classes   **(10 marks)**

    ii)   Write down the constructors for the two classes above   **(4 marks)**

    iii) Write a program segment to create an object of each class and show how these objects will call computeArea method   **(4 marks)**

Question Four (20 Marks)

a) Enumerate the functions of any four access modifiers in Java programming language(**4 marks**)

b) Differentiate between

    i)   a local variable and a global variable **(2 marks)**

    ii)   Concrete class and abstract class(**2 marks**)

c) Explain two ways that can be used to pass values to a method during call **(2 marks)**

d) Use an example to show how an interface can be declared and implemented in a Java program **(6 marks)**

e) Define the term operator as used in programming. Identify and briefly explain three main categories of operators Java language   **(4 marks)**

Question Five (20 Marks)

a) Distinguish an array and list(**2 marks**)

b) Write a Java code segment that will create a single dimensional array of size 20 and populate it with string values entered from the keyboard, then displays the content on the screen(**4 marks**)

c) Write a Java program that will initialize a two dimensional of 4 rows and 6 columns with integer values, sums the contents of the array then displays the sum on the screen   **(6 marks)**

d) State the importance of comments in programming then use appropriate examples to explain how comments are included in a Java program   **(4 marks)**

e) Write a Java program segment with a method of type float and receives three floating points values, computes their product and returns product.   **(4 marks)**