SCMK

Name:_____ Index No:_____/_____

2920/203
OBJECT ORIENTED PROGRAMMING
November 2013
Time: 3 hours

Signature:_____

Date:_____

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE II

OBJECT ORIENTED PROGRAMMING

3 hours

INSTRUCTIONS TO CANDIDATES:

*Write your **name** and **index number** in the spaces provided above.*
***Sign** and write the **date of examination** in the spaces provided above.*
*This paper consists of **EIGHT** questions.*
*Answer any **FIVE** of the eight questions in the spaces provided in this question paper.*
All questions carry equal marks.
Candidates should answer the questions in English.

For Examiner's Use Only

Question	1	2	3	4	5	6	7	8	Total Score
Candidate's Score									

This paper consists of 18 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

Turn over

1. (a) List **four** examples of *Object Oriented Programming* languages other than C++. (2 marks)

(b) (i) Explain the term *unstructured* programming. (2 marks)

(ii) Write an *if* control structure statement equivalent to the following C++ program statement.

```
x=(a>b)?a:b;
```

(2 marks)

(c) (i) Differentiate between *hybrid* object *oriented databases* and *pure* object *oriented databases*. (4 marks)

(ii) Explain a circumstance under which each of the following access specifier would be used in a C++ program:

I. private; (2 marks)

II. protected. (2 marks)

(d) Write a C++ program that would define a class named *power* with the following properties:

Data member:
- product;

Member functions:
- power;
- calculate_power.(using a for loop control structure)

The program should then accept two integer values (x and y) and determine the value of x^y through the use of the member function *calculate_power*. The program should then output the result of x^y .Use a default constructor to initialize product to 1. (6 marks)

2. (a) Explain each of the following terms as used in Object Oriented Programming languages:
(i) abstraction; (2 marks)

(ii) sizeOf. (2 marks)

(b) Differentiate between *keyword* and *identifier* as used in Object Oriented Programming language. (4 marks)

(c) Write a C++ program that accepts 20 characters from the computer Keyboard and the program should then store the characters in a text file. (5 marks)

(d) Write a C++ program that accepts the interior dimensions in metres of a cubical tank. The program should then calculate and output:

(i) the interior surface area;

(ii) the quantity of paint required for the interior surface area given that 1 litre covers 2 square metre. (7 marks)

3. (a) Outline **three** characteristics of *static data members* as used in object oriented programming. (3 marks)

(b) (i) Explain **two** uses of *nested* classes in Object Oriented Programs (4 marks)

(ii) Describe a *virtual class* as used in Object Oriented Programming languages. (2 marks)

(c) With the aid of an example in each case, differentiate between the implementation of a *decimal* integer constant and *octal* integer constant. (4 marks)

(d) Write a C++ program that has the following class, data members and member functions:

Class name:

Product;

Data members;

x

Member functions:

Void display

Objects:

a

b

result

The program should then initialize the objects *a*, *b* and result with the values 15, 35 and 1 respectively using a *parametized constructor*. The program should then compute and display the value of result given that result=a * b. (7 marks)

4. (a) State two properties of *static member* functions as used in C++ programming. (2 marks)

(b) (i) Explain the purpose of *getline()*as used in C++ Programs. (2 marks)

(ii) State **two** reasons that justify the use of *files* in C ++ programs. (2 marks)

(c) (i) Differentiate between *binary* and *unary* operator over loading as used in Object Oriented Programming languages. (4 marks)

(ii) Figure 1 shows categories of data types used in C++ programs. Use it to answer the question that follows.

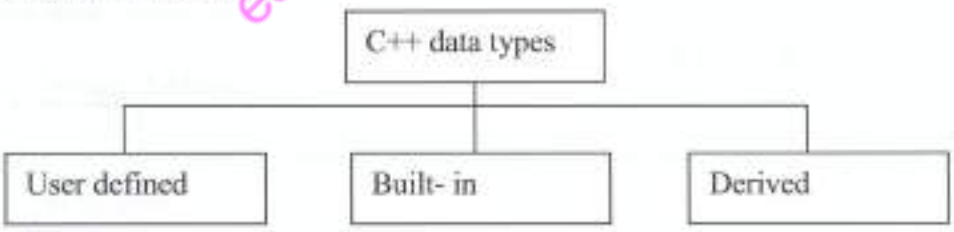

Figure 1

List **two** examples for each of the categories. (3 marks)

(d) (i) Given that a=4 and b=6, determine the value of a|b. (2 marks)

(ii) I. Write the general syntax for *operator overloading*. (3 marks)

II. State a reason for the use of *operator overloading*. (2 marks)

5. (a) (i) State **three** uses of a *friend* class in object oriented programming. (3 marks)

(ii) Explain the term *virtual function* as used in Object Oriented Programming Language. (2 marks)

(b) (i) Explain a circumstances under which each of the following operators can be overloaded:

I. [ ]; (1 mark)

II. ( ); (1 mark)

III. >>. (1 mark)

(ii) Differentiate between a *compound assignment* operator and a *relational* operator. (2 marks)

(c) Interpret each of the following C++ program statements:

(i) *b=(int) a;* (1 mark)

(ii) *int b (int a);* (1 mark)

(d) (i) Write the syntax for defining a destructor in a C++ program. (2 marks)

(ii) Figure 2 shows a class inheritance. Use it to answer the question that follows.

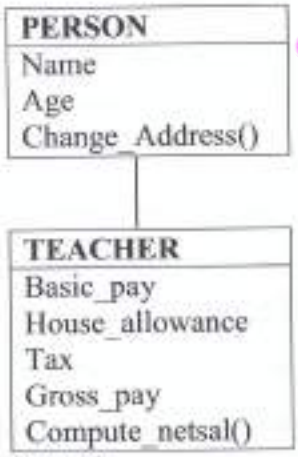

Figure 2

Write a C++ program that would implement the classes named teacher and person. The program should then accept the name, age, basic salary, house allowance, rate of taxation and calculate the net salary through the Compute_netsal(). The program should then output the net salary.
Hint: tax= basic salary * rate of taxation. (6 marks)

6. (a) Outline **two** purposes of a *free store* in programming. (2 marks)

(b) Explain each of the following terms as used in Object Oriented Programming language.

(i) runtime polymorphism; (2 marks)

(ii) pure virtual function. (2 marks)

(c) (i) Differentiate between a *windows based* and a *command based* operating system. (2 marks)

(ii) Class C is a derived class of class B, class B is a derived class of class A. Class C and B are the base classes of class D.

I. Represent this inheritance in a diagram. (2 marks)

II. Write a C++ program syntax to represent these classes. (3 marks)

(d) (i) Explain a circumstance under which a *friend* function would be used to overload an operator. (2 marks)

(ii) Figure 3 shows the dimensions of a ring. Use it to answer the question that follows.

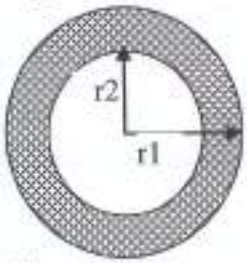

Figure 3

Write a C++ program that accepts the values of r1 and r2 and calculates the area of the shaded part through the use of an *inline* function. The program should then output the shaded area.
Hint: area of a circle =pie *Radius*Radius. (5 marks)

7. (a) (i) Define the term *coercion polymorphism* as applied in OOP. (2 marks)

(ii) Use the following C++ program segment to answer the question that follows:

```
float radius=7.0;
int area;
float pie=3.14;
area=pie*radius*radius;
```

Compute the value of *area*. (2 marks)

(b) Explain each of the following terms as used in object oriented programming:

(i) static resolution: (2 marks)

(ii) virtual destructor. (2 marks)

(c) (i) Object oriented programming language has both classes and structures. Justify the existence of each of these two in this language. (2 marks)

(ii) State the output from the following C++ program.

```
#include<iostream.h>
int a=10;
int main()
{
    int m=20;
    {
    int b=a;
    int a=5;
    cout<<"B ="<<b;
    cout<<"A ="<<a;
    }
    cout<<"m="<<m;
    return 0;
}
```

(2 marks)

(d) (i) Give that a=2, b=25, c=8, and d=5, evaluate each of the following C++ program equations.

I. y=(y=a,y*2); (2 marks)

II. x=(a*sqr(b)*d%a)-(c/a+(a*b/d)); (2 marks)

III. z=(4/a+c/2*(c+d)*b). (2 marks)

(ii) The following is a C++ program segment. Use it to answer the question that follows.

```
float num1 = 8.3;
int num2 = 10;
double num3 = 2.4;
int result = (int)num1 +(int) num2 +(int) num3;
```

Calculate the value of *result*. (2 marks)

8. (a) (i) Define the term *public inheritance* as used in OOP. (2 marks)

(ii) Explain **two** reasons that justify *data hiding* in object oriented programming. (4 marks)

(b) (i) With the aid of an example, explain the term *message passing* as used in Object Oriented Programming language. (4 marks)

(ii) Explain **one** reason that justify the use of *typedef* specifiers in C++programming. (2 marks)

(c) List **four** characteristics of *constructors* as used in OOP. (2 marks)

(d) Write a C++ program that declares the following data structure:

```
enum Object
{
        Square,
        Cube,
        Sphere
};
```

The program should prompt the user to enter the object index, using the switch control structure, the program should then calculate and output the area of the square and the volume of the cube and sphere. (6 marks)