

Name: _____ Index No: _____

2920/203

OBJECT ORIENTED PROGRAMMING

November 2012

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.
Answer any FIVE of the EIGHT questions in the spaces provided.
ALL questions carry equal marks.*

For Examiner's Use Only

Question	1	2	3	4	5	6	7	8	Total
Marks									

This paper consist of 16 printed pages.

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

1. (a) Outline **four** advantages of encapsulation as used in C++ programs. (4 marks)

- (b) Explain **two** features of pure Object Oriented Databases (OODBs). (4 marks)

- (c) Differentiate between call-by-value and call-by-reference as used in C++ programs. (4 marks)

- (d) Write a C++ program that will implement a class named LecRoom containing two variables and two constructors (unparameterised and parameterised). The constructors are used to initialize two objects A (12, 15) and B (21, 24) respectively. In addition, the class contains a method named Area used to determine the area of the objects. (8 marks)

2 (a) Interpret the following C++ program. (4 marks)

```
#include <cassert>
class IntList
{
private:
    int m_anList[10];
public:
    int operator[] (const int nIndex);
};
int IntList::operator[] (const int nIndex)
{
    assert(nIndex >= 0 && nIndex < 10);
    return m_anList[nIndex];
}
```

3. (a) Outline **three** advantages of modular programming. (3 marks)

(b) Daniela was revising for an examination when she came across the term *function prototype*. Outline **four** functions of the feature during compilation of a C++ program. (4 marks)

(c) Distinguish between *static* and *dynamic* binding as used in C++ programs. (4 marks)

(d) The following are properties of a class named Circle:

- a data member named radius;
- a function member named set_values used to initialize the data members;
- pure virtual method named area.

Write a C++ program that will implement two derived classes of the class. The derived classes should determine and output area and circumference of a circle with radius 21 units respectively. Use pointers. (9 marks)

4. (a) Define each of the following as used in C++ programs:

(i) destructor; (2 marks)

(ii) abstract class. (2 marks)

(b) Describe each of the following data structures as used in C++ programs:

(i) stack; (2 marks)

(ii) queue. (2 marks)

- (c) Write a C++ program that implements a class named Odd with a data member named x and method named read that accepts an integer from the keyboard. The program determines whether the integer is odd or even and displays an appropriate message. Use the if statement. (4 marks)

- (d) Table 1 shows details of stocks owned by clients at a particular investment company.

Client1	80	1000	550	700	9000	150
Client2	200	100	3000	850	1200	745
Client3	300	4000	250	100	800	900

Table 1

Write a C++ program that will create an object to store the numeric data in the table using an array. The program should determine the total stocks at the company through the use of a friend function and output the result. Use a constructor and for loop structure. (8 marks)

5. (a) Explain **two** challenges of emerging trends in Object Oriented Databases (OODBs). (4 marks)

- (b) Distinguish between *overloading unary* and *overloading binary* operators in C++ programs. (4 marks)

- (c) Write a C++ program that would accept the radius and determine the volume through the use of an inline function. The program should then output the volume. Use π as 3.142.

Hint volume = $\frac{4}{3} \pi r^3$. (4 marks)

- (b) (i) Explain **one** circumstance under which a derived class would violate encapsulation requirements in C++ programs. (2 marks)

- (ii) Interpret the following code C++ program segment. (2 marks)

```
int x = 0;
int *pointer_to_x = &x;
(*pointer_to_x) = 1;
```

- (c) Write a C++ program that would use the bubble sorting algorithm to arrange the following list of numbers in ascending order. The program should output the unsorted and sorted list.

84, 36, 68, 10, 53, 79, 38, 45, 90, 28

(6 marks)

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- (d) Figure 2 represents a standard stream class hierarchy. Use it to answer the questions that follow.

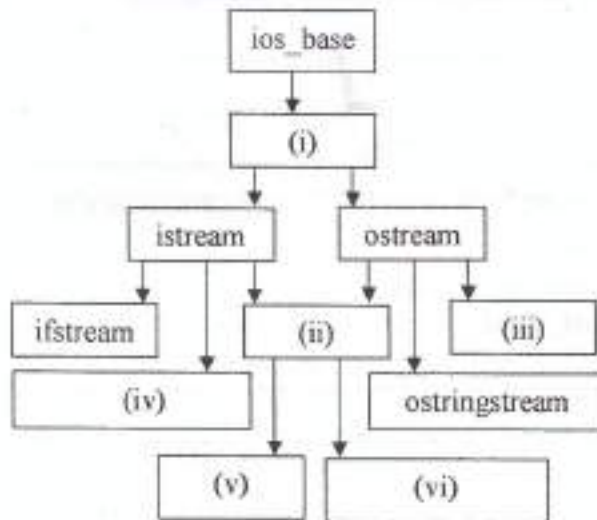


Figure 2

- (i) Identify the standard streams labelled (i), (ii), (iii), (iv), (v) and (vi) in figure 2. (3 marks)

- (ii) Explain **one** function of each of the streams (v) and (vi) identified in (i). (4 marks)

7. (a) (i) Outline **two** limitations of identifiers as used in C++ programs. (2 marks)

- (ii) Outline **two** disadvantages of implicitly dereferencing a pointer in C++ programs. (2 marks)

- (b) Explain **two** advantages of linked lists as used in OOP. (4 marks)

- (c) Distinguish between *bitwise copy* and *logical copy* constructors as used in C++ programs. (4 marks)

- (d) Write a C++ program that would define a base class named Speed containing two data members, a function member named `set_value` having the values (200, 4); and a derived class named Vehicle containing a function member named `velocity` which returns a value. The program should display the velocity.

Hint: $\text{velocity} = \text{distance} / \text{time}$. (8 marks)

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8. (a) (i) State **four** examples of object oriented languages. (2 marks)

- (ii) Outline **two** disadvantages of OOP. (2 marks)

- (b) Explain **one** circumstance under which each of the following is used in C++ programs:

- (i) dynamic object; (2 marks)

- (ii) local object; (2 marks)

- (c) Joel intends to write a report on the basic rules of implementing operator overloading in C++ programming. Explain **three** rules he is likely to mention. (6 marks)

- (d) Write a C++ program that will implement a class named Wedge with appropriate dimensions only. The program should determine and output the volume of the shape in figure 3. Include a constructor and a destructor.

Hint: $\frac{1}{2}$ base * height

(6 marks)

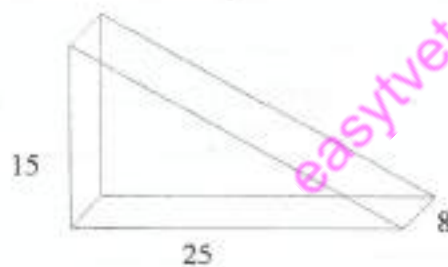


Figure 3
