

2920/203  
OBJECT ORIENTED PROGRAMMING  
November 2016  
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL  
DIPLOMA IN INFORMATION TECHNOLOGY

MODULE II

OBJECT ORIENTED PROGRAMMING

3 hours

INSTRUCTIONS TO CANDIDATES

*You should have the following for this examination:*

*Answer booklet.*

*Answer FIVE of the following EIGHT questions.*

*All questions carry equal marks.*

*Candidates should answer the questions in English.*

**This paper consists of 4 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) (i) Explain the way in which object oriented programming supports each of the following reasoning:
- I. induction; (2 marks)
  - II. deductive. (2 marks)
- (ii) Outline **three** typical steps in object oriented programming. (3 marks)
- (b) Distinguish between *selector* and *setter* operations as used in OOP. (4 marks)
- (c) (i) Define the term data abstraction as used in OOP. (1 mark)
- (ii) Peter, a module II student, is convicted that *struct* is an abstract data type. Explain **four** reasons to justify Peter's position. (8 marks)

2. (a) (i) Outline **four** reasons why OOP is popular in software development. (4 marks)
- (ii) Describe *dynamic binding* as used in OOP. (2 marks)
- (b) Distinguish between *state* and *behaviour* of an object as used in OOP. (4 marks)
- (c) Study the following C++ program segment and answer the questions that follow.

```
class point {
    private:
        int x, y;
        point (int i, int j){x=i; y=j};
    public {
        float midx();
        void displayxy();
};
```

- (i) Identify two errors in the program providing a possible solution in each case. (4 marks)
- (ii) Explain the implication of using each of the *access specifiers* in the program. (4 marks)
- (iii) Interpret the 4<sup>th</sup> line in the program segment. (2 marks)

3. (a) Evaluate each of the following C++ statements (show your working).
- (i)  $b = 12 + 4 - 7 * 9 \% 6 + 12/3$  (2 marks)
  - (ii)  $13 - (8\%5) > -9\%7 - 3 + 6 * 2$  (2 marks)
- (b) (i) Write a C++ program that accepts the radius of a circle and uses an inline function to determine the area of circle. The program should output the area of the circle. (4 marks)
- (ii) Describe the circumstance under which the following varieties of classes are used in OOP:
- I. data managers; (2 marks)
  - II. data source/sink. (2 marks)

- (c) Write a C++ program that accepts the dimensions of a rectangle and a rhombus. The program should then use an *overloaded function* named *area* to determine area of the respective figures. Output the dimensions and areas of the figures. (8 marks)
4. (a) (i) Explain the term recursive function as used in programming. (2 marks)
- (ii) Distinguish between *value* and *variable* parameters as used with functions during C++ program writing. (4 marks)
- (b) (i) List **four** rules that are applicable when using constructors in C++ programs. (4 marks)
- (ii) Write a C++ program that will implement a class named *arithmetic* with three integers initialized to 5, 7 and 10 respectively and a member function used to determine and output the product of the integers. Use a parameterized constructor. (5 marks)
- (c) Interpret the following C++ program segment. (5 marks)

```
#include < iostream >
using namespace std;
class myclass {
    int a;
public:
    myclass() { a=120; }
    int get();
};
int myclass::get() { return a; }
int main() {
    myclass ob;
    myclass *p;
    p=&ob;
    cout<< "output value using pointer: " << p->get();
    return 0; }
```

5. (a) (i) State **two** ways of using references in C++ programs. (2 marks)
- (ii) Distinguish between *friend function* and *function prototype* as used in C++ programs. (4 marks)
- (b) Explain **three** benefits of *inheritance* as applied in OOP. (6 marks)
- (c) (i) Helen would like to implement operator overloading in her system project. Outline **two** restrictions associated with operator overloading that she should consider. (2 marks)
- (ii) Write a C++ program that will implement a class named *matrix* with following properties: (6 marks)
- data members as x and y;
  - a constructor for initializing the matrix elements (x = 3 and y = 4);
  - a member function for displaying the matrix elements;
  - an overloaded operator function for determining the product of the matrix with a scalar that is input in the main program.

Note: The program should display the matrix elements of the product.

6. (a) (i) Explain the following forms of inheritance as used in OOP:
- I. extension; (2 marks)
  - II. limitation. (2 marks)
- (ii) Describe the circumstance under which each of the following concepts are most applicable in OOP:
- I. abstract class; (2 marks)
  - II. virtual function. (2 marks)
- (b) Copy constructors are only used for initialization in OOP. Describe **three** occurrences of initialization where they are applicable. (6 marks)
- (c) Write a C++ program that will write characters to a file until the user enters '\$' to stop. (6 marks)
7. (a) Outline **four** disadvantages of implementing inheritance in C++ programs. (4 marks)
- (b) Distinguish between coupling and cohesion as used in OOP. (4 marks)
- (c) Explain the term *destructor* as used in C++ programs. (2 marks)
- (d) Write a C++ program that will carry out the following:
- define a class named *circular* that has data members named *radius* and *height*, a member function named *set* which is used to initialize the value of *length* and *height* and a virtual function named *volume*;
  - implements a derived class from *circular* named *cylinder* whose radius and height are 14 cm and 10 cm respectively;
  - implements a derived class from *circular* named *cone* whose radius and height are 14cm and 5 cm respectively;
  - outputs the volume for the *cylinder* and *cone*.
- Use pointers. (10 marks)
8. (a) Explain **two** reasons for using I/O files in OOP. (4 marks)
- (b) Distinguish between overloading unary operators using member functions and using friend functions. (4 marks)
- (c) The module III candidates have been advised to use OOP in their projects. Explain **two** measures that they should put in place in order to cope with the challenges in OOP. (4 marks)
- (d) Write a C++ program that uses an array of objects to generate the following output. Use for loop. (8 marks)
- |   |   |
|---|---|
| 1 | 2 |
| 3 | 4 |
| 5 | 6 |
| 7 | 8 |

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