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.

Turn over

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 4th 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 'S' 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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