

Subject: **OBJECT ORIENTED PROGRAMMING WITH C++**
Time: 3 Hours

Max. Marks: 100

DECEMBER 2010

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after half an hour of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

a. Who is the creator of C++?

- (A) Dennis Ritchie (B) Bjarne Stroustrup
(C) Ken Thompson (D) Ernest Tello

b. Which of the following is not a valid statement regarding a C++ structure?

- (A) Structures cannot have functions.
(B) Access specifiers can be used with the members of a structure.
(C) Members of a structure are by default public.
(D) Structures can have heterogeneous data.

c. Which of the following is a valid function declaration?

- (A) void fn(int [][[]], char *); (B) void fn(int a[][10][10], char *p);
(C) void fn(int a[][[]], char *p); (D) void fn(a[][10][10], *p);

d. By default, objects are passed to functions

- (A) As constants (B) By value
(C) By reference (D) As individual members

e. The return type of a constructor is

- (A) void (B) int
(C) void * (D) a constructor cannot have a return type

f. When we write class A: public B, public C it means that

- (A) A is the base class (B) A, B and C are at the same level
(C) A is inherited from B and C (D) B and C are inherited from A

g. Which of the following function template definitions is valid?

- (A) template <class A, B> void fun(A a, B b) { ... } (B) template <class A, class A> void fun(A a, A b) { ... }
(C) template <class A, typename B> void fun(A a, B b) { ... } (D) template <class A, class B> void fun(A a, B b) { ... }

h. _____ Operator cannot be overloaded.

- (A) || (B) <<
(C) . (D) &

i. Exception handling mechanism helps us to manage _____ errors in the programs.

- (A) Runtime (B) Syntax
(C) Compile time (D) None of these

j. Which of the following class is the base of all the input/output stream hierarchy?

- (A) ios (B) istream
(C) ostream (D) ostream

**Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.**

Q.2 a. Briefly explain the four main programming paradigms. (8)

b. What do you understand by preprocessor and preprocessor directives? (4)

c. What will be the output of the following code segments? (4)

(i) `int i = 32;
i <<= 3;
cout << "\nAfter i <<= 3, i = " << i;
i >>= 6;
cout << "\nAfter i >>= 6, i = " << i;`

(ii) `int i = 10, j = 5, k = 18;
cout << "i = " << i << " j = " << j << " k = " << k << endl;
++k = i++ + ++j;
cout << "i = " << i << " j = " << j << " k = " << k << endl;`

Q.3 a. Write a program to print the n^{th} prime number. For example, if the user enters n as 4, then the program should display the output as 7. (8)

b. What will be the output of the following code segments? (8)

(i) `int n = 1234;
for (; n != 0; n = n/10){
 cout << n%10;
 n = n /10;
}`

(ii) `int a = 10, b = 20;
if ((a < b) || (a = 5) > 10)
 cout << "a = " << a;
else
 cout << "b = " << b;`

(iii) `// Assume that the memory address of pi is 1000 and that of i is 1004
int *pi, i;
pi = &i;`

```

*pi = 10;
cout << i << " " << &i << " " << *pi << " " << pi << " " << &pi << endl;
i = 20;
cout << i << " " << &i << " " << *pi << " " << pi << " " << &pi
<< endl;

```

```

(iv) //Assume that a pointer occupies 4 bytes in memory
int *pi = new int [10];
float *pf = new float [20];
double *pd = new double [30];
cout << sizeof(pi) << " " << sizeof(pf) << " " << sizeof(pd);

```

- Q.4** a. Write a program to illustrate the following:-
 (i) Return-by-value (5)
 (ii) Return-by-reference (5)
- b. Compare inline functions and macros. (4)
- c. Define recursion. Explain its working. (4)
- d. Give the applications of function overloading. (3)
- Q.5** a. Design a class named Person, with name and address as private members. Here address is an object of class named Address with the private members: street, town, state, country and pincode. Define a suitable constructor of the Person class and a function displayPerson() to print the details of a person. (8)
- b. Explain how constructors differ from other member functions of a class. (4)
- c. Define *this* pointer. What are the restrictions on its usage? (4)
- Q.6** a. What do you understand by operator overloading? List atleast four restrictions for overloading operators. (6)
- b. Design and implement suitable class to support the following *main* function: (10)
- ```

int main() {
 complex a(3, 4);
 complex b = a;
 a = a + b;
 cout << a << b;
}

```
- Q.7** a. Briefly explain virtual base classes. Give its applications. (6)
- b. With the help of an example explain the difference between an IS-A and HAS-A relationship? (4)
- c. What will be the output of the following program? (6)
- ```

class A {
    int a;

```

```

        public:
            A() {    a = 0;    cout << "\nIn A";  }
            A(int x){ a = x;   cout << "\nIn A with a = " << a;  }
            ~A()    {          cout << "\nDestroying A"; }
    };

    class B    {
    char      b;
    public:
        B() {  b = 0;          cout << "\nIn B";    }
        B(char x){ b = x;      cout << "\nIn B with b = " << b;  }
        ~B()   {              cout << "\nDestroying B"; }
    };

    class C : public A, public B {
    public:
        C(int i, char c) : B(c){ cout << "\nIn C with i = " << i; }
        ~C()   {              cout << "\nDestroying C"; }
    };

    int main() {
        C      obj(10, 'z');
        return 0;
    }

```

- Q.8** a. Write a template function that sorts the elements of the array passed to it as an argument. (6)
- b. When is the multiple *catch* statements used with a *try* block? What is the significance of *catch(...)*? (5)
- c. Explain namespace and unnamed namespace. Give an example for illustration. (5)
- Q.9** a. What are ios functions? Give the functionality of the following ios functions:
 (i) width() (ii) fill()
 (iii) precision() (iv) setf()
 Also mention the manipulators corresponding to these functions. (8)
- b. How is a vector container different from a list container? Write the program segment to create a vector having 10 integers, fill the vector with numbers from 1 to 10 and then display the contents of the vector. (8)